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How to feed an army

United States. War Dept. Subsistence Dept

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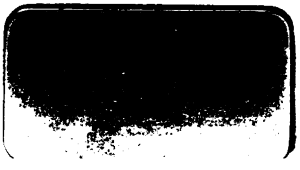

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HOW TO FEED AN ARMY.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF WAR,

FOR USE IN THE

ARMY OF THE UNITED STATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

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WAR DEPARTMENT,

Document No. 129.

SUBSISTENCE DEPARTMENT.

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PREFACE.

At the close of the civil war a circular was addressed from the Office of the Commissary General of Subsistence to the various commissary officers who had seen service during that war, requesting reports concerning the duties which they had performed, the methods adopted in executing the same, and any recommendations they might see fit to make, the purpose being to collect thorough information concerning the operation of the Subsistence Department during the civil war. Such reports are of the greatest value, as they make it possible to make a complete study of that war, and from the same to evolve a system which would be applicable in any future war. To enable officers to make a study of these conditions, these reports are published in full, and no alterations or eliminations have been made in them.

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TABLE OF WRITERS.

Names.	Duties last performed.
Bvt. Brig. Gen. C. L. Kilburn, Acting Commissary General of Subsistence, U. S. A.	Chief commissary of subsistence, Department of the South.
Bvt. Col. M. R. Morgan, commissary of subsistence, U. S. A.	Depot commissary of subsistence, Fort Leavenworth, Kans.
Bvt. Lieut. Col. Jno. L. Hathaway, commissary of subsistence of volunteers.	Washington, D. C.
Capt. N. J. Sappington, commissary of subsistence of volunteers.	Elmira, N. Y.
Capt. G. W. Campbell, ommissary of subsistence of volunteers.	Chicago, Ill.
Capt. Jno. N. King, commissary of ubsistence of volunteers.	St. Louis, Mo.
Lieut. Col. C. C. Carpenter, chief commissary of subsistence, Fifteenth Army Corps.	Chief commissary of subsistence, Fifteenth Army Corps.
Capt. and Bvt. Maj. W. P. Martin, commissary of subsistence of volunteers.	Depot commissary of subsistence, City Point, Va.
Capt. Geo. S. Leland, commissary of subsistence of volunteers.	Harpers Ferry, Va.
Capt. W. R. Murphy, commissary of subsistence of volunteers.	Baltimore, Md.
Capt. Daniel S. Hart, commissary of subsistence of volunteers.	New York City, N. Y.
Capt. F. C. Ford, commissary of subsistence of volunteers.	Trenton, N. J.
Capt. S. S. Patterson, commissary of subsistence of volunteers.	Chief commissary of subsistence, District of Southwest Virginia.

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HOW TO FEED AN ARMY.

WAR DEPARTMENT,
OFFICE COMMISSARY GENERAL OF SUBSISTENCE,
November 14, 1900.

On the 1st of June, 1865, the Commissary General of Subsistence sent a circular letter to various commissaries upon the subject of "How to feed an army," citing the following topics to be answered, viz:

1. Duties of the commissary of an army, army corps, division, brigade, and regiment, while lying in trenches, during a siege; also while in winter quarters or on marches.
2. Establishment and service of grand depots, sites, etc.
3. Establishment of corrals for the herding of cattle, etc.
4. Movement of stores by rail, sea, or river.
5. Preservation of stores in the field and in depots.
6. The most effective means for hurried destruction of stores to prevent their use by an enemy.
7. The simplest efficient marching ration of the soldier.
8. The number of complete rations that a soldier can carry on his person.
9. The number of marching rations that a soldier can carry on his person.
10. The number of days' supply for 1,000 men carried by an army wagon and how stowed, and capacity of railroad cars and army wagons, and best method of stowing them.
11. Cooking and cooking utensils.
12. Nature, etc., of reports made to superiors, and reports made by subordinates; when made, form, object, etc., in the field.
13. Nature of reports made by depot commissaries.

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14. Commissary property—scales, weights, desks, etc.—standard supply for a brigade for three months.
15. Stationery for a brigade for three months.
16. Commissary property—scales, weights, desks, etc.—standard supply for a depot.
17. Stationery for a depot.
18. Antiscorbutics, desiccated and green.
19. What articles are generally required to be purchased with the hospital fund and in what quantity.
20. Cubic space required for the storage of 1,000 rations.
21. What are the preferences of troops for various articles of the ration, what liked, what not liked, and what are the alleged objections.

The following comprise all reports received and are considered very important and exhaustive upon the subjects referred to:

HILTON HEAD, S. C., *June 19, 1865.*

GENERAL:

I have the honor to say, in answer to your circular letter of the 1st instant, received on the 14th of this month, that not having been actually in the field I have but little of the kind of practical information apparently asked for. My duties in this war began first in building the bakeries in the Capitol. Thence I was transferred to Baltimore and then to Cincinnati, in both these last places as purchasing officer. As such I had the usual experience. While at Cincinnati I was appointed chief commissary of the Department of the Ohio, and as such required monthly and semimonthly report of stock on hand and copies of the returns rendered you to be sent to me.

Since coming here as chief commissary of subsistence of this department I now require from the different commissaries trimonthly reports of stock on hand and copies of returns and reports made to you. At the end of each month I make my required reports to you of officers on duty in this department of our corps.

My experience with beef cattle is that they should only be shipped in this climate on the open deck of seagoing side-wheel steamers. Desiccated vegetables, desiccated potatoes,

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and peas will hardly be taken by the troops as a gift. Salt fish, too, are objected to, where fresh fish are so plenty. We find great difficulty with the weevil here, and our stores rapidly injure if exposed.

Respectfully,

C. L. KILBURN,
Brevet Brigadier General,
A. C. G. S., and Chief C. S., D. S.

To GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

OFFICE DEPOT COMMISSARY OF SUBSISTENCE,
FORT LEAVENWORTH, KANS., *November 25, 1865.*

GENERAL:

I have the honor to send you herewith my answer to some of the questions contained in your circular letter of June 1, 1865.

I have written on that which I knew most about; I could, perhaps, give you some information on nearly all the questions propounded by you, but I could not do them that justice that officers who have made them their specialty could do. Some of the officers of the department have attended to depot duties alone.

I hope, when all the reports are in, the important questions which you ask will have been answered.

Very respectfully, your obedient servant,

M. R. MORGAN,
Brevet Colonel and Commissary of Subsistence.

To GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

Duties of the commissary of an army.—This officer, under the Commissary General, regulates all subsistence matters in his army; receives, makes, and fills requisitions; distributes rare articles, such as antiscorbutics; receives reports of the amount and nature of supplies in depots and in hands of the troops, and of the number of hides, hoofs, and horns, and quantity of tallow and oil on hand, as well as the number on hand

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at the last report; the number of animals slaughtered since last report; in short, requires an account of all the inedible parts of every animal slaughtered; receives reports of officers, and reports in return to the Commissary General the names of all officers of his department in his army, showing how each one is employed; locates the main depots and corrals; fixes, monthly, a uniform price at which subsistence stores shall be sold to officers, and announces the cost of the hospital ration for each ensuing month; when not on campaign, causes frequent inspections to be made as to the manner in which stores are kept and cared for, the amount of funds on hand, and how far every officer is up with his accounts. He should not be responsible for either funds or stores; he should dispose of all surplus funds under the direction of the Commissary General; he should cause each commissary of a corps or other independent command to send him each month a list of all commissary employees, with statement of occupation and rate of compensation, and should, under the orders of the Commissary General, regulate the number and pay of such employees, and, in general, drive in every nail that he finds loose.

The commissary of an army should be careful to make timely requisitions. He should be careful to ask for nothing perishable which is not absolutely required. The requisitions should be made out carefully, in term of rations and with strict regard to the number of persons to be subsisted. He should try to avoid hurrying the purchasing officer, who, if he be hurried unexpectedly, may have to pay exorbitantly for his stores, and calling upon the department of transportation hurriedly, transports are paid extraordinary prices. As the great bulk of transportation of an army is for the Subsistence Department it will be readily seen that a careful, clear-minded, far-sighted commissary of a large army can save to the Government a great deal in a short time.

The duties of a corps commissary, as well as those of an army, are entirely administrative. He transmits all instructions received for officers under him from the corps commander and the commissary of the army. He receives frequent reports of the amount and variety of subsistence on hand in

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trains and on the persons of the troops. When not in campaign the trains are replaced by storehouses. He receives reports of the disposition made of empty packages, hides, etc. These reports he consolidates and sends to the commissary of the army. The corps herd of beef cattle, under charge of an officer, moves as he directs, moving with the train when the train keeps near the troops, but in any case the herd must be kept near the corps to which it belongs. When trains break down and hard bread, coffee, and sugar give out, the men can at any rate have fresh beef. This herd is replenished from time to time, from the general herd.

The commissary of a corps gets his orders from his corps commander or from the commissary of the army of the number of days' beef cattle to be kept on hand, as well as the number of days' rations to be kept in trains and on the persons of the troops. He sees that these orders are strictly carried out. In campaign he directs when and at what point to make issues, being informed by his corps commander when it would be safe to move the supply train to the front. When not in campaign the issues are made at fixed intervals, and at such times he will frequently inspect the stores and the papers of his subordinates, see that the stores are properly cared for, that the officers understand how to make their returns, and that they use due diligence in making them out and forwarding them to the proper bureaus. He sees that the division commissaries receive all funds from the officers who make sales and that such funds are immediately handed in to the nearest depot officer. In fine, the duties of this officer are of the same nature as those of the commissary of an army, but on a small scale. He is closer to the troops and to the officers upon whom the well-being of the troops depends. The position requires an active, able, conscientious man, fully alive to the great responsibility resting upon him.

The commissary of a corps being so close to the troops can save the commissary of the army a great deal of anxiety and the Government a great expense by criticising judiciously, before consolidating and forwarding, the estimates that come up to him for stores, particularly fresh vegetables. It has been very common for brigade commissaries to send in most

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extraordinary estimates, which should never have gone beyond the headquarters of the army corps. While it is very well for the brigade commissary to send in his estimate for vegetables in order that he may show the number of pounds he can dispose of, the corps commissary, after consultation with the medical director of the corps, should represent to his commander what articles he thinks necessary, selecting such articles as are least perishable, most easily transported, and least expensive, and make his requisitions accordingly. I believe that a plentiful supply of potatoes and onions is sufficient vegetables to prevent scurvy, all else being favorable. Trifling complaints are very often sent up from a regiment to the headquarters of an army, which should have been examined into and corrected at brigade headquarters, but certainly should not have passed the headquarters of the corps. Every corps commissary should understand, should feel, that a complaint passing up through his headquarters unexamined and uncorrected is a reflection upon his own efficiency as an officer and a reflection upon the efficiency of the officers serving under him through whom the complaint has passed. Every complaint should be thoroughly inquired into, and, if well founded, corrected; and this can be done better by the corps commissary or those under him than by the commissary of the army. All complaints against the subsistence department should receive the personal attention of the officers of that department.

The division commissary is responsible to the commissary of the corps for the proper administration and condition of the subsistence department in his division. He sends him, as often as practicable, consolidated reports of the stores in hand of troops and in trains or storehouse, as well as reports of the disposition of the hide, horns, hoofs, etc., of each animal slaughtered. He draws stores in bulk at the depot and issues to brigade commissaries. When on campaign he conducts that part of the supply train which is assigned to the subsistence department from depot to the front, and, after turning over to the brigade commissaries, returns from the front to the depot with the empty wagons. When the army is in motion the train will be divided into two parts at least, one

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going, loaded, to the front, while the other goes, empty, to the rear. Each part is under charge of a division commissary. Before leaving depot he should use all reasonable means to ascertain that his stores are in good order, and when on the march see that they are not plundered. He makes no sales or small issues. While the commissary train is constantly in motion the main corps train for the other departments remains together in a body, and for this there must be detailed an officer to make sales and small issues. There has to be an officer detailed also at the headquarters of each division for a similar purpose—make sales and issue to detachments and prisoners of war. In winter quarters the division commissary substitutes a storehouse for his trains, and so far as his issues are concerned he might as well be absent; but while he should always give all the attention possible to the commissaries under him making sales and small issues, he can more especially do this in winter quarters or when the march has ended or been temporarily discontinued. He will then by close attention get a pretty good idea of the amount of sales made in a certain time by each officer, and he will see that the amounts sold are accounted for. He will also see that the officers under him bring up back returns and keep them up, sending them off after examination by him. The division commissary, when the army is quiet, should attend the issues and sales of one or more of his subordinates each day. He will receive from the officers under him as often as once per week all the funds in their possession, taking or sending them to the depot officer at the rear. If there is a spare division commissary on a march he might be employed by the corps commissary as an inspector. When stationary, each division commissary has all the work he can attend to if he does his duty as above described.

The brigade commissary issues on consolidated provision returns to the separate regiments and detachments in his brigade. Before going into the field he should provide himself with a clerk, horse, bedding, mess kit, servant, a commissary chest and scales, and a tent, as well as a supply of stationery, blanks, and a copy of the Subsistence Regulations. He should be able to take care of himself. To carry his chest

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and scales, as well as stores for sales to officers, he is provided with a wagon. This wagon, when on the march, is kept with the ammunition train, and is brought up as often as required by orders for the convenience of the officers, being always brought up when issues are made to the troops, after which it is replenished and sent back again to its post. There is a certain amount required to be kept on the persons of the troops, and, when convenient, issues will be made every other day. This is, however, a matter to be controlled by the commander of the troops. The brigade commissary always remains near the troops, where his brigade commander can see him when necessary. He receives his supplies from the division commissary, issuing them from his wagons, which he returns to the division commissary when empty. One of the commissaries of brigade generally issues to the field hospitals of the division. In some cases there has been an officer who has had charge of the issues to and purchases for all the field hospitals of a corps, being under the orders of the medical director of the corps. The same officer has been able to issue and sell at corps headquarters. When troops are stationary, issues may be made for a longer period than when on a march, but this again is under the control of the commanding officer. In justice to the Government and the troops the accuracy of the scales should be frequently tested.

In no case should stores be issued that are not perfectly sound and wholesome. When a brigade commissary on a march finds that his stores are bad he should separate the bad from the good and have them inspected by an inspector, take an affidavit as to the circumstances under which they came into his possession, as boards of survey can not be assembled at such times. This will be sufficient to clear him if he is not in fault. He should have it understood throughout his brigade that whenever bad stores are issued to the troops they should be returned to him immediately and he will replace them by good.

In issuing to hospitals great care must be taken in keeping the account of the "credit" and in seeing that no purchases are made that are not authorized. The savings from the ration are ample for the comfort of the sick when care is taken that no purchases are made of articles for which there

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are appropriations either in the medical or quartermaster's departments.

The brigade commissary has charge of a brigade herd, which he keeps near the troops and replenishes from time to time, from the corps herd. Cattle should be grazed when practicable and should be slaughtered at least ten hours before it is issued, slaughtering in the evening and issuing in the morning, the animal being hung up when practicable. The brigade commissary should keep an account of the hides, hoofs, etc., of animals slaughtered, sending a report of the same to the division commissary. No part of the animal that is edible should be thrown away, given away, or wasted. There should be an understanding as to the proportion in which the "fifth quarter" should be issued, say at 2 pounds for 1 of contract beef, and sold to officers accordingly.

The brigade commissary should be held responsible and make returns for the commissary property in the hands of the regimental commissaries. He should personally attend the issue and sales, having separate hours for each, and when issuing to a regiment should insist upon the attendance of a commissioned officer from the regiment. If the regimental commissary is not present, some other commissioned officer should be there to represent him. At the end of each month he should see that his return of stores is correct. If he has a surplus on hand, he should account for it as "gained in issuing," or otherwise. If he is short of any articles he should endeavor to explain the cause of his deficiency and substantiate his statement by such evidence as he may be able to obtain. The commissary always sells for cash and on the certificate of the officer that it is for his own use. He must be careful in his account of sales, settling his cash account every night and turning in his money when required by those over him, or when he gets so much on hand that it becomes inconvenient to take care of it.

There is in each corps an artillery brigade, which, being generally very much scattered, requires a separate officer to issue to it. The duties of this officer are similar to those of a commissary of a brigade, he being supplied from the corps train.

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The commissary of a regiment generally receives the stores for his regiment from the brigade commissary on a consolidated provision return, and he has but to divide these stores up between the companies and small detachments into which the regiment may be divided. Each company should have a commissioned officer present at such distribution. The regimental commissary is generally the regimental quartermaster and should be at all times present at the front with the troops. When a commissary of a regiment issues on provision returns his duties are the same as those of a brigade commissary.

All officers who give receipts for stores must render returns in accordance with the requirements of the Regulations for the Army.

In a siege the duties of a commissary of subsistence are about the same as **on a march.** He must keep his trains so far off that in case of a sortie the enemy may not capture them, being prepared to drive up whenever the commander of the troops considers it safe to do so. **In a battle** neither issues nor sales can be made, and in such cases in the late campaign under Grant officers of the Subsistence Department were employed as aids-de-camp, and no regulation or orders can prevent this when the commanding officer wants aids in addition to those allowed him by law, and this, I suppose, occurs in every case. If we are not whipped and pursued, the arrangement is all right, but in the latter case the commissary should be with his train to do all he can to prevent it from falling into the hands of the enemy.

WASHINGTON, D. C., *August 14, 1865.*

GENERAL:

In compliance with your circular letter of June 1, 1865, relative to the solution of the problem "How to feed an army," I have the honor to submit the following statement as the result of my experience for the past four years, both in the field and at depot, as commissary of subsistence of volunteers.

I am, sir, very respectfully, your obedient servant,

JNO. L. HATHAWAY,
Brevet Lieutenant Colonel, C. of S. of V.

To BRIG. GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

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STATEMENT.

Duties of the commissary of an army—Duties of the commissary of an army corps.—As the duties of these positions will be fully and completely defined by those who have had experience in them, it would be deemed presumptuous in me, having had no actual experience therein, to attempt a definition thereof.

Duties of a commissary of division.—These are varied, and to their successful fulfillment, judgment, experience, and energy are required. In preparing for a march, he should see that the several brigades of the division, under direction of the brigade commissaries, are fully supplied with the quantity and kind of rations ordered by the commanding general, and that the supplies ordered carried in trains are properly stowed; this to be done, when practicable, by actual inspection.

The division train to be properly loaded and under his immediate supervision, and if during the march the division train is halted or parked at any considerable distance from the troops, the locality thereof should be made known to the several commissaries of the brigade of the division, in order to insure the prompt reloading of the brigade trains from it when necessary.

When beef cattle are to be driven with a division they should be under the direction of the division commissary and driven by a detachment of cavalry. When practicable the several brigade commissaries should draw from this herd, as required for killing, only.

The division commissary should also see that the rations carried by the trains are in proper proportions; that when issues are made there should not remain any surplus stores of one or more kinds, but that all should be exhausted together and his train reloaded from depot or base of supplies as soon as possible. He should make reports of the amount and kind of rations with his division from day to day, or as often as required by the corps commissary, and to the full and complete discharge of his duties, energy, patience, and perseverance should be exercised, and from his employees discipline and faithfulness in their several positions should be at all times exacted.

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In the event of a battle the trains should be in as safe a position as possible out of range of shot and shell, but not at such a distance as to be liable to be cut off, surprised, or captured by the enemy, and at all times ready to move at a moment's notice.

The exact positions for trains, however, are usually given by the commanding general through the chief quartermaster.

In sieges I have had no experience. If I might suggest a mode of procedure in such cases, it would be to watch closely the stores on hand, guard against waste of every kind, and use my best judgment in issues to make the stores hold out as far as possible consistent with the health and efficiency of the troops of the command, so far as such discretion might be given by the commanding officer.

The position of a division commissary while on the march is with his train. In winter quarters depots are established near the camps of the army from which the several commissaries may draw the necessary supplies.

The division commissary should require daily and weekly reports from the several brigade commissaries under him, stating the number of days' rations, and of the component parts of the ration issued and on hand, to see that beef cattle are drawn by the brigade commissaries, killed, and issued to the troops as often as required by orders (generally thrice per week), to make frequent inspections of the stores in the several brigades, and to give such advice and instructions to those under him as may from time to time be necessary.

Issues from a depot, or division train, are usually made in bulk upon invoices of the depot or division commissary and receipts of the officer to whom issued.

Duties of a commissary of brigade.—To see that rations sufficient for the use of his brigade are kept constantly on hand (when possible), and issues made to the several regiments of the brigade for from three to five days at a time, except in winter quarters, when in localities where the camps are dry and suitable, they may, without detriment, be made for ten days at a time, except fresh beef, which is to be issued three times per week, or as often as ordered by superior authority.

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He should also see that antiscorbutics are issued according to the wants of the troops whenever practicable for him to obtain them, in lieu of other component parts of the rations, as laid down in Army Regulations. The issues of rations to be made upon consolidated provision returns signed by the immediate commander of the troops to whom issued, and approved by the commanding general. He should endeavor to keep the requisitions of the hospitals to which he may issue well filled, and afford all the facilities in his power to the surgeons in charge thereof toward the procurement of such articles of diet and comfort as may be needed by the sick and wounded in the command and authorized by Army Regulations. When going into camp he should select localities for the placing of stores convenient to his brigade, and as dry as possible, keep his stores well and properly stowed, prevent by all means at hand waste of every kind, and see that the several regiments of the brigade obtain the exact amount of rations to which they are entitled, both in quantity and quality. He should make the daily and weekly reports required punctually; on marches he should keep his brigade train properly loaded with the stores ordered carried; when he finds by inspection (which should be frequently made) any damaged stores on hand, he should at once take such measures as may be necessary in the premises, and prescribed by Subsistence Regulations, to prevent unnecessary loss or damage.

Supplies for sales to officers should be kept constantly on hand. When cattle are slaughtered the hides should be salted if possible, rolled up, tied, and forwarded to the nearest depot, taking receipts for them from the officer who receives them. The tallow is also to be preserved and sent with the hides when practicable.

When on the march, brigade trains are usually consolidated and driven with division train. The position of a brigade commissary on the march is with his commanding officer.

Regimental commissaries attend to drawing stores from the brigade commissary and issue thereof to the several companies of the regiment, and see that each company is supplied with the rations to which it is entitled. Company commanders should make it their duty to attend as far as

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necessary to the cooking of the rations, and their faithful and regular issue to the men, as upon this depends greatly the health of the troops, and neglect of it causes discontent, discomfort, and to a certain extent affects discipline.

Establishment, and service of grand depots, sites, etc.—Want of experience on these points prevents my entering minutely into a description of any definite plans or arrangements for grand depots.

I will, however, in a very general way give my ideas as to the requirements for a building of this kind. A site should be selected upon eligible ground, convenient of access, and the building erected thereon with a view to strength, convenience, and capacity, fireproof if possible, not over three stories in height, well ventilated throughout, and furnished with hoisting apparatus of the highest power and best and most approved pattern.

In the division of labor in such a building, bookkeepers, invoice clerks, receipt clerks, check clerks, and laborers would be required, each with his place and duties clearly defined, and a punctual and prompt performance thereof strictly required. Standing orders to be conspicuously posted through out the building for the governance of the employees, as well as for those drawing supplies.

So much depends upon the size, capacity, etc., of the building, and the amount of business to be done, that I am at a loss to give any precise rules which would govern in all cases; such rules, however, should be established as would economize labor and at the same time secure efficiency and celerity in the business of the depot.

Corrals.—In establishing corrals for the herding of cattle, a field (size to be governed by the requirements of the case), say 20 acres to the 1,000 head, as dry as possible, should be selected, and inclosed with a strong fence, with sufficient gateways for the convenient ingress and egress of the cattle, and also a gateway of sufficient width to admit of the passage of but one or two head of cattle at a time, to facilitate and insure the correct counting of them in receiving or issuing.

Movement of stores, etc.—In moving stores by rail, box cars are generally used for the transportation of such supplies

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as are liable to damage by the elements; for transportation of pork, salt beef, or bacon open or platform cars will answer. In loading cars with pork or salt beef the barrels should be placed on their ends or chimes and as many stowed as the capacity of the cars will allow. In loading with flour the barrels are piled in tiers; barrels of sugar, beans, coffee, etc., are loaded in the same manner as pork. Hard bread in boxes is loaded in tiers, breaking joints when practicable in order to give stability. Cars being generally loaded from platforms, skids are used upon which to roll the barrels into the car. In loading boxes they are passed from hand to hand until deposited in the car, when they are properly stowed by one or two laborers skilled in the work; unloading to be done in a similar manner.

In transporting stores by wagon they are loaded as follows: Pork or salt beef, by rolling the barrels into the wagon on skids, if at hand; if not, then by rails or plank, whichever can be most readily obtained. They are then placed on their ends. On very good roads 10 barrels may be carried, but on marches over ordinary country roads 8 barrels constitute a load.

Sugar, beans, coffee, and salt (if in barrels) may be loaded in the same manner. Hard bread in boxes may be loaded as follows: First place two boxes endwise, next to the headboard, then lay three boxes next to them on the bottom of the wagon, two on their sides and one on its bottom. This nearly covers the width of the wagon box. Continue this process until the wagon is nearly loaded, then two boxes may be placed on end next the tailboard. This completes the loading; from 32 to 35 boxes constitute a load.

In unloading barrels, where no skids, plank, or rails are obtainable, one of the barrels may be taken out, placed on its head immediately in rear of the wagon; the other barrels may then be rolled out, dropped on the one placed to receive them, and thence lowered to the ground. Hard bread, soap, candles, etc., in boxes are shouldered by men and placed where wanted.

Driving, herding, feeding, watering, slaughtering cattle, and disposition and preservation of hides, tallow, etc.—In driving cattle care should be constantly exercised; they should

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be kept together, and, when practicable, driven in herds of from five to eight hundred. Much depends upon herders. They should be sober, energetic, and humane men, and accustomed to the work; about 20 men, exclusive of the chief drover, to 1,000 head of cattle, will be sufficient, where the country to be traveled over is tolerably open. In thickly wooded regions more will be necessary. In distributing herders about a herd two or three should be placed in front to keep the leading cattle from traveling too fast, two or three in the rear of and the others on either side of the herd; the cattle should not be hurried, but allowed to travel slowly, the herd, however, being kept well together, as above mentioned. The distance that cattle may be safely driven per day varies somewhat with the season. In very warm weather from 12 to 14 miles is a good day's drive. In spring or fall, over good roads, 3 or 4 miles more may be made without injury to the herd. When pasturage is good en route they should be turned into a field at night, care being taken in the selection of a field that it be well watered, with running stream if possible.

The cattle will here rest, cool, feed, and water. They should be started early in the morning, and in hot weather should be allowed to rest during the heat of the day, being driven, say, four or five hours in the morning and three or four hours in early evening. They should be allowed to drink wherever a suitable stream is found on the route. At night guards should be stationed around the field in which the cattle are herded to prevent loss by straying, etc.

When cattle are kept in corral, they should be fed and watered twice per day, when possible, good dry hay, plenty of good water, cut feed of hay and bran and ground hard bread, well salted, may be fed to advantage, corn in the ear also; the latter, however, to be fed sparingly in warm weather, as it has a tendency to heat the blood and otherwise injure the cattle. They should also be salted freely, at least twice per week. Hay, cut feed, corn, etc., amounting to about 20 pounds in the aggregate per day, to each head, will be sufficient to keep the cattle in good order and condition.

When practicable, cattle before being slaughtered should stand, say, twelve hours without food or water. This renders

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the beef better and it will keep longer, and in all cases cattle should, after driving, be allowed to rest and cool off completely before being killed.

In the field the usual method of killing cattle is by shooting them in the curl of the forehead, their throats then immediately cut, and the animals allowed to bleed freely by hoisting them up by their hind quarters, or placing them on sloping ground, head downwards; after the bleeding, the hide should be taken off, the head cut off, and the animal hung up by its hind quarters. This is done by first procuring and setting firmly into the ground two forked poles about 10 feet high and 8 feet apart, and upon these lay a pole of sufficient strength to bear the weight of the animals killed. The ends of what is known as a gambrel or tree are then passed through the gambrels, separating the hind legs, a rope tied to the center of the tree, the other end thrown over the horizontal pole, and the animal hoisted thereby until clear of the ground. The chuck is then separated from the body, the legs disjointed at the knee and gambrel joints, the tallow and entrails taken out, the body split through the backbone from head to tail, the entrails, when practicable, to be buried at once. After hanging for, say, twelve hours, a part of the animal heat will have left the beef, and shrinkage will have taken place. The animal is then cut into quarters and is ready for issue. If an animal is killed, dressed, and immediately thereafter issued to the troops, it is very liable to cause diarrhea, and is otherwise prejudicial to health.

Hides (in the field) may be spread upon the ground, inside up, the bone in the tail to be taken out in all cases, the hide sprinkled plentifully with salt, and if to be moved quickly, rolled up, each by itself, and placed in wagon for transportation to depot. When in permanent camp or quarters and under cover, hides should be spread out, inside up, placed in layers, each hide salted, and the pile allowed to remain from ten to twenty days, when each hide may be folded up and tied; they are then ready for sale or shipment.

When there are conveniences for rendering tallow, it may be cut into small pieces (this is not absolutely essential, however), placed in caldrons, and allowed to boil slowly until

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thoroughly rendered; it should be stirred frequently to prevent burning, and when what is known as "cracklings" rise to the surface, become very light and of a brown color, it is done. It is then strained into coolers, and when sufficiently cooled poured into barrels, the top of the barrel to be left open.

At the National Monument cattle yard in this city, where from 800 to 900 head of cattle are slaughtered and issued per month, the process of slaughtering and dressing cattle is as follows: The cattle are placed in the slaughter pen in the evening; on the follwing morning they are brought into the slaughter-house by throwing a rope over their horns, passing the other end through the bull ring, and drawing them in. A blow in the forehead with an ax fells them to the floor, their throats are then immediately cut, allowing the animals to bleed freely, the floor being so arranged that the blood flows into the center, and thence out through a shute into offal scows ready to receive it. The hide is then taken off, care being used to prevent cutting it in the process, the head cut off, legs disjointed at the knee and gambrel joints. The animal is then hoisted clear of the floor, by means of a "tree" and windlass, the tallow and entrails taken out, chuck severed from the body at fourth joint (inclusive of ring-bone joint) of neck, the animal split through the back-bone from head to tail, wiped thoroughly inside and out with cloths, and left to hang until wanted for issue. In the winter season it is better to let the beef hang one or two days, if practicable, before issue. When about to be issued, the shins are taken off 4 inches above knee joint (in fore quarters) and 8 inches above the gambrel joints (in hind quarters); the beef, cut into quarters, is then entirely ready for issue.

By actual experiment it has been found that the animal heat leaves the beef in from twenty-two to twenty-seven hours after being killed, the loss by shrinkage during this time is very near 2½ per cent. The weights of the portions of beef not issued (entrails, blood, etc.), taking an average steer weighing, say, 1,200 pounds on the hoof, is very nearly as follows: Head and tongue, 39 pounds; feet, 19 pounds; liver, 11 pounds; lights, 9 pounds; rough tallow, from 80 to 90 pounds; hide, 120 to 125 pounds; blood, 50 to 55 pounds; other offal,

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from 200 to 250 pounds; chucks, from 35 to 40 pounds; shins, from 16 to 20 pounds. These figures prove conclusively that the standard adopted by the Subsistence Department, allowing 50 per cent of the weight of an animal (when over 800 pounds live weight), in putting it into fresh beef, is as nearly correct as possible.

The usual time required to kill and dress an animal is from twelve to twenty minutes; if necessary, however, it could be be done in less time.

When the hides, tallow, hoofs, horns, chucks, shins, etc., are to be delivered to contractors, they are immediately after being taken from the animal placed in a room set apart for the purpose, and thence delivered to contractor.

Preservation of stores in the field and in depots; best packages, sizes and capacity; relative keeping properties of stores, and principal sources of loss or damage.—In the field, barrels of pork and salt beef should be placed in tiers (sleepers underneath each tier), and when the space will admit, two tiers high, and seldom, if ever, over three tiers high. The whole should be covered with paulins, to protect it from the sun. The barrels should be frequently rolled, and, when necessary, coopered; otherwise they may become leaky.

Bacon should be kept in a cool, dark, and dry place when practicable, and whenever found to be wormy, repacked, wiping it, and taking out the unsound pieces.

Hard bread in boxes should be piled in layers and in such a manner that the air may circulate freely between and through the layers; it should be kept in a dry place covered with paulins, and frequently inspected. If it is found that the bread is becoming wormy or moldy, it should be unpacked, the good very carefully separated from the wormy and moldy bread and repacked, the boxes being first carefully wiped and thoroughly dried. Unless great care is exercised in separating all the wormy or moldy bread, it will soon again require repacking, as the least mold will gradually spread, tainting the whole mass in a short time.

Sugar should be kept in a dry cool place, and will not injure unless exposed to the sun or heat.

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Barrels of coffee and salt require to be kept well coopered and dry.

Soap should be kept dry, the boxes piled in tiers or layers; it improves by age.

Barrels and kegs of molasses should be kept well coopered, and should not be exposed to the weather.

Boxes of pepper should be kept dry and as tight as possible.

Barrels of potatoes should be kept dry, and the air allowed to circulate through by cutting or boring holes in the barrels.

Beans should be kept dry, and the barrels well coopered.

Rice is not liable to spoil unless exposed to moisture. Age does not tend to improve it.

Desiccated potatoes and mixed vegetables in cans are not liable to spoil.

In my opinion the best packages are as follows: For pork or salt beef, barrels containing 200 pounds of meat. Bacon in boxes 20 by 20 by 28 inches, outside measurement, containing 225 pounds each when to be carried in the field, otherwise in casks. Hard bread in boxes 26 by 17 by 11 inches, outside measurement, containing 50 pounds of bread. Sugar in barrels containing from 210 to 225 pounds each. Beans in barrels containing from 200 to 240 pounds each. Coffee in barrels containing from 130 to 170 pounds each. Green coffee in sacks containing from 100 to 160 pounds each. Rice in barrels containing about 250 pounds each. Desiccated potatoes and mixed vegetables in air-tight cans. Whisky in barrels containing 42 gallons each. Vinegar in kegs containing 15 gallons each, or in barrels containing 42 gallons; the former are preferable. Soap in boxes 17 by 15 by 11 inches, outside measurement, containing 80 pounds each. Salt in barrels containing from 260 to 280 pounds each, or in sacks containing from 200 to 250 pounds each. Pepper in boxes containing 25 pounds ground for use, and packed in papers of 4 ounces each. Potatoes in barrels containing 150 pounds each. Molasses in kegs containing 12 to 15 gallons each.

As to the relative keeping properties of stores, I have found, of salt meats, that good, sound, mess pork is most easily kept and longest preserved, and is, in my opinion, preferable to either salt beef or bacon for army purposes. Salt beef will

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keep well for a good length of time when properly attended to. Bacon will keep if well prepared and kept as above mentioned. Sugar, coffee, beans, soap, salt, and pepper are not liable to spoil if kept dry and cool. Potatoes will soon rot unless the above precautions are taken. Molasses is very liable to waste by leakage.

The principal sources of damage arise in pork and salt beef from leakage, caused by improper cooperage or long exposure to the weather. Bacon becomes soft and wormy. Hard bread is affected by mold or worms, induced by exposure to dampness. Sugar gathers moisture, and will waste to a certain extent by drainage. Salt will not waste if kept dry. Coffee, tea, soap, and pepper with ordinary care will not spoil; at least, I have never known it to happen during my experience.

Most effective means for hurried destruction of stores to prevent their use by an enemy.—I should knock the barrels of pork and salt beef to pieces as much as possible, allowing the brine to escape. Boxes of hard bread to be knocked to pieces, piled up, and fired; upon this burning pile throw all barrels and packages at hand, and if there be whisky on hand it may be thrown over the pile to facilitate burning.

Simplest efficient marching ration.—Where cattle are driven and on hand for issue, the simplest efficient marching ration is hard bread, coffee, sugar, and salt. When fresh beef is not to be had, salt pork, salt beef, or bacon should be substituted therefor.

Number of complete rations that a soldier can carry on his person.—Same for marching ration.—Three days' complete rations may be carried. Of marching rations eight days' may be carried; five days' rations is, however, as much as should be ordinarily taken.

Number of days supply for 1,000 men carried by an army wagon, and how stowed in wagon.—Complete rations and marching rations.—From 2,500 to 2,800 pounds is as heavily as army wagons are usually loaded upon ordinary country roads. Taking this as a standard, 750 rations of, say, ¼ pound pork, ¼ pound salt beef, ¼ pound bacon, hard bread in boxes, beans, ¼ pound coffee, and ¼ pound tea, sugar, vinegar, candles,

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soap, salt, and pepper, may be safely loaded and carried in an army wagon as follows: Salt pork in two barrels (281¼ pounds); salt beef in 2 barrels (234 pounds); bacon in one barrel (140¼ pounds); hard bread in fifteen boxes (750 pounds); beans in one barrel (112½ pounds), in which may also be carried, in a bag, 28½ pounds of salt and a package of 2 pounds of pepper; sugar in one barrel (112½ pounds), in which may also be carried, in a bag, 45 pounds of ground coffee and a package of $2\frac{81}{100}$ pounds of tea; 30 pounds of soap and 10⅝ pounds of candles may be carried in one box; 7½ gallons of vinegar in a keg, and the whole stowed in the wagon as per diagram below.

The dimensions of an army wagon, as laid down in Subsistence Regulations, is as follows: Box 114 inches long (inside measurement), 42 inches wide (inside measurement), 22 inches high. By actual measurement, however, of those in use at the "Washington Monument Subsistence Depot," the dimensions are as follows: Box 120 inches long (inside measurement), 43 inches wide (inside measurement), 22 inches high. Upon this measurement, which it is believed will hold good with most, if not all, the army wagons (4-horse or 6-mule) now in the service, this diagram is drawn.

This gives a load weighing about 2,536 pounds.

Of marching rations of hard bread, coffee, sugar, and salt, 1,500 rations may be carried, hard bread loaded first, coffee, sugar, and salt in rear end of wagon.

Capacity of railroad cars and army wagons, in complete rations, in marching rations, loaded with one article only, number and kind of packages, and best method of stowing them.—The dimensions of an ordinary box car are as follows: Length 27 feet (inside measurement), width $7\frac{1}{12}$ feet (inside measurement), height 6 feet (inside measurement). This gives a space of 1,282½ cubic feet. The capacity of this car is from 18,000 to 20,000 pounds. Platform or open cars are usually 26 feet long and 8 feet wide, capacity from 14,000 to 18,000 pounds.

When a box car is loaded with pork or salt beef, 60 barrels, placed on their ends or heads, constitute a load; of flour, piled in tiers, 100 barrels; hard bread, 360 boxes. About 6,000 rations (complete) may be loaded in a box car; salt meats to

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be stowed in the ends over the trucks, other stores in the center.

Cooking and cooking utensils.—When on the march and with marching rations, each soldier usually does his own cooking; the utensils necessary thereto are a small frying pan, tin cup, spoon, and knife. The frying pan may be dispensed with if necessary, substituting a pointed stick, upon which the pork or fresh beef is placed and broiled before the fire.

In camp, camp kettles and mess pans are used (the allowance being five mess pans and two camp kettles to every 15 foot or 13 mounted men), in which soups and coffee may be made and meats boiled or fried. I have found that what are known as Shaker gridirons, made of wire, are very convenient and useful to broil meats in; they are light, very easily carried, not liable to get out of order, and would, in my opinion, be a decided acquisition to the cooking utensils now allowed and in use.

Nature of reports made to superiors, and reports made by subordinates; when made, form, object, etc.—*In the field.*—1. Monthly reports on 1st day of each month, to be made to the Commissary General, U. S. A., agreeably to paragraph 9, General Orders, War Department, No. 160, of 1863.

2. Monthly reports on 1st day of each month, to be made to Adjutant General, U. S. A., pursuant to General Orders, War Department, No. 244, July 28, 1863.

3. Daily reports, a form of which is hereto annexed, marked "A."

4. Weekly reports, a form of which is hereto annexed, marked "B."

Forms "A" and "B" are rendered by commissaries of brigades to division commissaries.

Reports from division to corps commissaries are consolidated from reports of commissaries of brigades, and reports from corps commissaries consolidated from reports of commissaries of division to chief commissary of army.

5. The usual monthly returns to Commissary General and Third Auditor of United States Treasury, as prescribed by

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Subsistence Regulations, approved by Secretary of War, June 8, 1863.

At depots.—Reports made by depot commissaries, of course, vary with the different kinds of business done at the various depots. The reports required and made from the depot of which I am in charge are as follows:

1. Daily morning report of safety of buildings and public property, as per form hereto annexed, marked "C."

2. Daily morning report of cattle and forage on hand, as per form hereto annexed, marked "D."

3. Weekly report of employees, as per form hereto annexed, marked "E."

4. Trimonthly report of "hides, tallow, horns, hoofs, chucks, shins, etc., delivered to contractor," as per form hereto annexed, marked "F."

5. Monthly report of clerks' and employees' compensation, etc., as per form hereto annexed, marked "G." Same form as weekly report, marked "E."

6. The usual monthly returns to the Commissary General and Third Auditor of the United States Treasury pursuant to Subsistence Regulations, approved by Secretary of War, June 8, 1863.

7. Estimate of subsistence stores required for issue to troops, etc., form hereto annexed, marked "H."

Commissary property.—*Scales, weights, desks, etc.; standard supply for a brigade for three months.*—The standard supply of commissary property for use of a brigade commissary in the field is as follows: One field table, one field desk, one platform scale; one spring balance complete; one commissary chest, containing spring balance, two liquid measures, two metal faucets, one funnel, one molasses gate, one scoop, one cleaver, one hatchet, one meat saw, one meat hook, four butcher knives, one butcher steel, one tap borer.

Of stationery for three months.—Ten quires of letter paper, ten quires of cap paper, two quires of envelope paper, six sheets of blotting paper, 300 official envelopes, one quart black ink, one bottle of red ink, eight ounces of sealing wax (a bottle of mucilage is in my opinion more useful), one gross steel pens (12 dozen), one dozen penholders, one dozen lead

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pencils, one piece rubber; one dozen blank books, memorandum (six would be sufficient); one inkstand, one ruler, one eraser, one paper folder, and one dozen pieces red tape.

At depots.—The amount and kinds of commissary property and stationery used are governed by the requirements of the case.

Antiscorbutics, desiccated and green.—Desiccated: Potatoes, mixed vegetables, cabbage in currie, pickles. Green: Potatoes, onions, beets, carrots, turnips, etc.

Articles required to be purchased with hospital funds.—All articles of diet, solid or fluid, not furnished by the Subsistence Department, such as milk, butter, eggs, oranges, lemons, farina, etc. As to the amount required by 1,000 men in hospital per month, I am at a loss for any rule which would apply generally, but should rely upon the estimates of the surgeon in charge.

Cubic space required for the storage of 1,000 rations, of each article of the ration, in the usual packages.—The actual cubic space required for the storage of 1,000 complete rations, consisting of pork, hard bread, beans, coffee (roasted and ground), sugar, vinegar, candles (adamantine), soap, salt, pepper, molasses, and fresh potatoes, is $107\frac{1543}{1728}$ cubic feet.

Cubic space required for the storage of 1,000 rations, of each article of the ration, in usual packages is as follows:

750 pounds of pork or salt beef, $3\frac{150}{200}$ barrels, $23\frac{756}{1728}$ cubic feet.

750 pounds of bacon in boxes, $21\frac{1045}{1728}$ cubic feet.

1,125 pounds of flour (18 ounces to ration), $5\frac{145}{196}$ barrels, $31\frac{1509}{1728}$ cubic feet.

*1,000 pounds of hard bread, 20 boxes, $56\frac{472}{1728}$ cubic feet.

100 pounds of rice, $\frac{2}{5}$ barrel, $2\frac{864}{1728}$ cubic feet.

150 pounds of beans, $\frac{3}{4}$ barrel, $4\frac{1188}{1728}$ cubic feet.

80 pounds of coffee (roasted and ground), $\frac{1}{2}$ barrel, $3\frac{816}{1728}$ cubic feet.

100 pounds of coffee (green) $\frac{4}{8}$ barrel, $3\frac{1566}{1728}$ cubic feet.

15 pounds of tea, one-third of a 45-pound chest, $18\frac{1}{2}$ by 18 by 14 inches, $\frac{1554}{1728}$ cubic foot.

150 pounds of sugar, $\frac{3}{8}$ barrel, $4\frac{2988}{1728}$ cubic feet.

80 pounds of vinegar, 10 gallons, $1\frac{582}{1728}$ cubic feet.

*Calculated at 16 ounces to a ration, that being ration allowed on campaign or march; at permanent post 12 ounces is ration.

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12½ pounds of candles, $\frac{614}{1728}$ cubic foot.

40 pounds of soap, ½ box, $\frac{1408}{1728}$ cubic foot.

37½ pounds of salt, $\frac{1344}{1728}$ cubic foot.

2½ pounds of pepper, $\frac{1}{10}$ box, $\frac{154}{1728}$ cubic foot.

300 pounds of fresh potatoes, 2 barrels, $12\frac{864}{1728}$ cubic feet.

32½ pounds of molasses, 2½ gallons, $\frac{575}{1728}$ cubic foot.

The following are the usual sizes for packages, outside measurement, made in usual manner:

Box for hard bread, 26 by 17 by 11 inches, 4,862 cubic inches; 50 pounds.

Box for soap, 17 by 15 by 11 inches, 2,805 cubic inches; 80 pounds.

Box for candles, 17 by 11 by 10½ inches, $1,963\frac{5}{10}$ cubic inches; 40 pounds.

Box for pepper, 14 by 11 by 10 inches, 1,540 cubic inches; 25 pounds.

Box for bacon, 28 by 20 by 20 inches, 11,200 cubic inches; 225 pounds.

"In calculating the bulk of subsistence stores for purposes of storage or transportation, 6¼ cubic feet are considered a barrel." (Extract from Subsistence Regulations.)

The foregoing calculations are made upon this basis.

Preferences of troops for various articles of the ration; what liked, what not liked, and what are the alleged objections.—So far as my experience goes of the different articles of the ration the following are those most in request by the Army: Fresh beef, salt pork, fresh bread (when possible), flour, hard bread, beans, coffee, sugar, soap, salt, vinegar, candles, pepper, molasses, rice, and fresh potatoes. Salt beef, bacon, desiccated potatoes, and mixed vegetables are not, in my opinion, favorite articles of food with the Army.

Alleged objections.—The objections to salt beef is the length of time required in cooking thoroughly, and the large quantity of water required. Bacon is not attractive unless thoroughly clean and free from worms; it is very liable to become wormy, particularly when in the field and without facilities for keeping it properly. Desiccated potatoes and mixed vegetables

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are objected to by reason of want of knowledge to prepare them properly for the table.

It will be seen by reference to your circular letter that some of the interrogatories propounded therein have not been touched upon in this statement. No discourtesy is intended thereby, but lack of experience on the subject-matters mentioned therein alone prevents my giving satisfactory answers in the premises.

I have deemed it proper in this connection to prepare and annex hereto a report showing the business of the depot at National Monument yard in this city from the time I was placed in charge thereof to August 1, 1865, all of which is

Respectfully submitted.

JNO. L. HATHAWAY,
Brevet Lieutenant Colonel,
Commissary of Subsistence of Volunteers.

A.

Daily morning report of subsistence stores on hand in the 3d Brig., 1st Division, 3d A. C., A. of P., September 18, 1863.

Number of days—	Salt meat.	Hard bread.	Coffee.	Sugar.	Salt.	Pepper.	Candles.	Soap.
In command	3	3	3	3	3	5	2	2
In wagons	------	4	4	4	4	------	------	------

The strength of the brigade is ..... 1,150 men.
The strength of the details is ..... 475 men.

Total strength is ..... 1,625 men.

Respectfully submitted,

——— ———,
Capt. and C. S. V.

To CAPT. C. M. ROBINS,
C. S., 1st Div., 3d A. C., A. of P.

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B.

Weekly Report of fresh bread and vegetables issued to 3d Brigade, 1st Division, 3d A. C., Army of Potomac, for week ending September 18, 1863.

Days of fresh bread issued	4
Days of fresh vegetables issued	4
Number of beef cattle killed	8
Number of hides turned in	4

NOTE.—Four hides were, for want of transportation, abandoned at camp of the 16th inst. near Culpeper C. H., Va.

Respectfully submitted.

____ ____,
Capt. and C. S. V.

To CAPT. C. M. ROBINS,
C. S., 1st Div., 3d A. C., A. of P.

C.

NATIONAL MONUMENT YARD,
Washington, D. C., ____, *1865.*

COLONEL:

I have the honor to report the safety of the buildings and other public property at this depot this morning.

Very respectfully, sir, your obedient servant,

____ ____,
Capt. and C. S. V.

LIEUT. COL. G. BELL, *C. S.*

D.

Report of beef cattle, sheep, and forage on hand at Washington, D. C., July 4, 1865.

Station.	No. of Cattle.	No. of Sheep.	Hay.	Bran.	Ground bread.	Ear corn.
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Fort Runyon	24	------	------	------	------	------
Mechanicsville	1,002	------	------	------	------	------
Bladensburg	498	------	------	------	------	------
National Monument Yard	112	169	------	------	------	------
Total	1,636	169	929,000	24,000	21,000	210,000

I am, very respectfully, your obedient servant,

____ ____,
Capt. and C. S. V.

To LIEUT. COL. G. BELL, *C. S.*

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E.

Weekly report of clerks and employees under the direction of Bvt. Lieut. Col. J. L. Hathaway, C. S. V., at Washington, D. C.

"E. & G." No.	Names.	How employed.	Compensation.	Remarks.
			Dolls. *Cts.*	
1	E. S. Prime	Clerk	90 00	Per month.
2	H. B. Kellogg	do	75 00	Per month.
3	Jas. T. McKean	do	75 00	Per month.
4	Jno. C. Stewart	Superintendent	72 00	Slaughterhouse.
5	Augustus Barrett	Foreman	60 00	Slaughterhouse.
6	Patrick McCauley	1st class butcher	54 00	Slaughterhouse.
7	James Kuhns	do	54 00	Slaughterhouse.
8	John Foley	Watchman	42 00	Slaughterhouse.
9	Martin O'Brien	do	42 00	Meat house.
10	Clifton B. Scott	Messenger	36 00	
11	Jas. Mulholland	Laborer	36 00	

Respectfully submitted.

_____ _____,

Bvt. Lieut. Col., C. S. V.

To Lieut. Col. G. Bell, *C. S.*

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F.

Report of hides, tallow, hoofs, horns, chucks, shins, etc., delivered to Messrs. J. E. Bathgate & Co., contractors, from cattle slaughtered at National Monument Yard, Washington, D. C., by Bvt. Lieut. Col. Jno. L. Hathaway, C. S. V., from July 1 to 10, 1865, inclusive.

Date.	No. of receipt.	Hides, tallow, hoofs, horns, chucks, shins, etc., from cattle slaughtered, number.	Date.	No. of receipt.	Cattle died, number.	Portions delivered.
1865.			1865.			
July 1	1	28	July 6	4½	4	Hides, tallow, hoofs, and horns.
July 3	2	37	July 7	5½	12	Hides only.
July 5	3	25	July 10	7½	6	Hides only.
July 6	4	22				
July 7	5	17				
July 8	6	36				
July 10	7	26				
Total slaughtered		191	Cattle died		22	

Recapitulation.

Hides, tallow, hoofs, horns, chucks, and shins from ..... 191 cattle slaughtered.
Hides, tallow, hoofs, and horns only, from ..... 4 cattle died.
Hides only, from ..... 18 cattle died.

Total delivered 213

Respectfully submitted.

To Lieut. Col. G. Bell, *C. S.*

_____, *Bvt. Lieut. Col. and C. S. V.*

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H.

Estimate of subsistence stores required for issue to troops, etc., stationed at ———, for the month of June, 186—.

Post or station.	Number of troops.	Number of employees.	Number of days.	Total number of rations.	Pork.	Salt beef.	Flour.	Hard bread.	Beans.	Rice.	Coffee (R. and G.).	Tea.	Brown sugar.	White sugar.	Candles.	Soap.	Salt.	Pepper.	Vinegar.	Molasses.	Fresh potatoes.	Remarks.
Fredericksburg, Va																						
Falmouth, Va																						
Sales																						
Contingencies																						
Total																						
					Bbls.	*Bbls.*	*Bbls.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Gals.*	*Gals.*	*Lbs.*	
Quantity in bulk																						
Quantities on hand (estimated)																						
Quantities required																						

Stores should arrive, if practicable, by May 29, 186—.

———, *Capt. and C. S. V.*

NOTE.—Flour 18 ounces to ration; hard bread 12 ounces to ration; salt 3¾ ounces to 100 rations; pepper 4 ounces to 100 rations; molasses 1 quart to 100 rations; fresh potatoes 30 pounds to 100 rations.

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REPORT OF BUSINESS DONE AT NATIONAL MONUMENT YARD, WASHINGTON, D. C., IN THE FRESH BEEF DEPARTMENT, FROM MARCH 1, 1864, TO AUGUST 1, 1865.

The following tables show the number of beef cattle received and slaughtered; estimated gross and net weights, and true weights thereof; loss by shrinkage; amount of fresh beef issued to troops, etc.; amount sold and issued to officers; amount condemned; number hides, tallow, hoofs, horns, chucks, and shins, etc., delivered to contractors, together with results of experiments, upon weights, etc., of beef cattle, made by order of Lieut. Col. G. Bell, C. S., in November, 1864; also number of sheep received and slaughtered; amount of mutton issued to officers and others; amount of mutton condemned.

Date.	Number of cattle received and slaughtered.	Estimated weights.		True weights as taken from slaughter and meat house reports.	Loss by shrinkage.	Total amount of fresh beef issued.		Total amt. fresh beef condemn'd.
		Gross.	Net.					
1864.		*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Ozs.*	*Lbs.*
March	938	1,106,840	553,420	539,620	2,182	509,886	08	-----
April	732	845,460	422,730	458,193	2,444	489,244	00	1,262
May	762	918,972	459,486	532,771	5,410	506,582	04	1,847
June	831	988,890	494,445	523,165	5,884	532,481	04	-----
July	844	1,004,360	502,180	512,028	7,054	548,002	04	-----
August	977	1,152,858	576,429	558,408	6,302	507,677	12	-----
September	914	1,063,896	531,948	498,738	6,587	482,963	04	688
October	793	921,466	460,733	458,112	9,570	448,102	00	-----
November	668	781,560	390,780	397,032	9,258	410,510	00	-----
December	876	1,021,416	510,708	496,107	8,736	455,655	08	1,007
1865.								
January	847	997,766	498,883	506,891	9,526	485,156	00	1,960
February	721	866,642	433,321	450,209	9,192	444,944	04	3,021
March	700	827,400	413,700	460,376	9,716	441,155	08	-----
April	689	819,910	409,955	485,378	8,021	494,218	12	-----
May	1,0.8	1,284,660	642,330	656,845	7,513	665,812	04	-----
June	733	875,901	437,950½	455,916	4,696	476,463	00	-----
July	618	748,387½	374,193¾	366,679	7,085	356,685	08	-----
Total	13,741	16,226,384½	8,113,192¼	8,356,468	119,176	8,315,550		9,785

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Amount of fresh beef and mutton sold and issued to officers from March 1, 1864, to July 31, 1865, inclusive, by Bvt. Lieut. Col. Jno. L. Hathaway, C. S. V.

Date.	Fresh beef sold.	Mutton sold.	Fresh beef issued.	Mutton issued.	Total beef sold and issued.	Total mutton sold and issued.
1864.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
March	3,279	-------	8,502½	-------	11,781½	-------
April	4,112½	-------	8,732½	-------	12,845	-------
May	3,573	-------	10,909	-------	14,482	-------
June	3,476	-------	10,999	-------	14,475	-------
July	3,351½	-------	9,335½	-------	12,687	-------
August	2,785	-------	9,720	-------	12,505	-------
September	3,316	-------	10,564	-------	13,880	-------
October	4,002	218	11,594	1,006½	15,596	1,224½
November	4,847	1,004	12,687½	2,047½	17,534½	3,051½
December	6,521½	1,381	13,802½	2,810	20,324	4,191
1865.						
January	6,590	1,152	13,595	2,972	20,185	4,124
February	7,038	1,300	12,821	2,610	19,859	3,910
March	7,075	1,041	13,981	2,884	21,056	3,925
April	5,123	477	12,628	2,506	17,751	2,983
May	5,378	369	14,007½	2,956	19,385½	3,325
June	3,005	399	12,440	2,609	15,445	3,008
July	1,911	380	10,198	2,289	12,109	2,669
Total issued and sold	-------	-------	-------	-------	271,900½	32,411

Date.	Number sheep received and slaughtered.	Weight.		Total amount of mutton issued.	Total amount of mutton condemned.
		Gross.	Net.		
1864.		*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
March	-------	-------	-------	-------	-------
April	-------	-------	-------	-------	-------
May	-------	-------	-------	-------	-------
June	-------	-------	-------	-------	-------
July	-------	-------	-------	-------	-------
August	-------	-------	-------	-------	-------
September	6	540	270	270	-------
October	37	3,367	1,683½	1,683½	-------
November	83	7,470	3,735	3,552	-------
December	149	13,410	6,705	6,497	30

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Amount of fresh beef and mutton sold and issued to officers from March 1, 1864, to July 31, 1865, inclusive, by Bvt. Lieut. Col. Jno. L. Hathaway, C. S. V.—Continued.

Date.	Number sheep received and slaughtered.	Weight.		Total amount of mutton issued.	Total amount of mutton condemned.
		Gross.	Net.		
1865.		*Pounds*	*Pounds.*	*Pounds.*	*Pounds.*
January	165	14,685	7,342½	6,966½	
February	152	13,486	6,743	6,024	470
March	144	12,816	6,408	6,479	
April	134	12,685	6,342½	6,502½	575
May	152	14,136	7,068	7,014	
June	154	14,014	7,007	7,241	
July	174	16,356	8,178	8,178	
Total	1,350	122,965	61,482½	60,407½	1,075

Reports of hides, etc., delivered.

Date.	Hides, tallow, hoof, horns, chuck, shins, etc., from number cattle slaughtered.	Hides, tallow, hoofs, and horns only, from number cattle died.	Hides only, from number cattle died.
1864.			
March	938		3
April	732	8	1
May	773	3	
June	834	19	8
July	871	13	45
August	977	10	21
September	914	9	5
October	793	7	1
November	668	4	6
December	876	4	1
1865.			
January	847	4	
February	721	14	
March	700	12	6
April	689	2	
May	1,082	20	
June	754	9	1
July inclusive	617	9	20
Total	13,786	147	118

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Sheep pelts received and turned over.

Date received.	Pelts from sheep slaughtered.	Pelts from various sources.	Date.	Pelts turned over.	
				Number.	To whom.
1864.			1864.		
September	6		December 5	219	C. E. Buck, commy.
October	37	21	December 28	130	agt., 6th St. Wharf,
November	83	47	1865.		Washington, D. C.
December	149	11	January 18	93	Do.
January, 1865	165	12	February 6	128	Do.
February	152	4	March 7	150	Do.
March	144		April 5	130	Do.
April	134		May 10	167	Do.
May	152		June 12	156	Do.
June	154	3	July 11	175	Do.
July	174	12	August	112	Do.
Total	1,350	110	Total	1,460	

Recapitulation.

Number of cattle received and slaughtered		13,741
Gross weight	pounds	16,226,384½
Net weight	pounds	8,113,192¼
True weight	pounds	8,356,468
Shrinkage	pounds	119,176
Fresh beef issued and sold to officers (included in total issue)	pounds	271,900½
Fresh beef condemned	pounds	9,785
Fresh beef issued		8,315,550
Number of sheep received and slaughtered		1,350
Gross weight	pounds	122,965
Net weight	pounds	61,482½
Mutton issued	pounds	60,407½
Mutton issued and sold to officers (included in total issue)		32,411
Mutton condemned		1,075
Hides, tallow, hoofs, horns, chucks, shins, etc., delivered to contractors from beef cattle slaughtered	number	13,786
Hides, tallow, hoofs, and horns, only, delivered to contractors from beef cattle slaughtered	number	147
Hides (hoofs and horns), delivered to contractors from beef cattle slaughtered	number	118
Sheep pelts received and turned over	number	1,460

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Cattle Department Report.

The following table shows the number of cattle received and issued on the hoof, estimated gross and net weights thereof, number of cattle died, amount of forage consumed, number of sheep received and issued on the hoof, and number of sheep died, from February 13, 1865 (when I assumed charge), to August 1, 1865.

Date.	Number of cattle received.	Estimated weights.		Number of cattle issued.	Estimated weights.		Number of cattle died.	Estimated weights.	
		Gross.	Net.		Gross.	Net.		Gross.	Net.
1865.									
February	6,668	7,943,761	3,971,880½	3,276	3,921,242	1,960,621	----------	----------	-------
March	9,950	11,737,962	5,868,981	8,691	10,324,254	5,162,127	----------	----------	-------
April	12,894	15,275,530	7,637,765	13,052	15,475,430	7,737,715	7	8,316	4,158
May	1,550	1,822,500	911,250	1,111	1,300,752	650,376	36	42,336	21,168
June	3,967	4,783,246	2,391,623	3,168	3,748,064	1,874,032	24	28,224	14,112
July	2,019	2,442,984	1,221,492	976	1,173,532	586,766	57	69,084	34,542
Total	37,048	44,005,983	22,002,991½	30,274	35,943,274	17,971,637	124	147,960	73,980

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Date.	Number of sheep received.	Estimated weights.		Number of sheep issued.	Estimated weights.		Number of sheep died.	Estimated weights.	
		Gross.	Net.		Gross.	Net.		Gross.	Net.
1865.									
February	350	31,002	15,501	3	265½	132¾	0	------	------
March	0	------	------	1	89	44½	0	------	------
April	300	28,400	14,200	0	------	------	3	282	141
May	0	------	------	0	------	------	5	465	232
June	300	26,935	13,467½	6	558	279	3	270	135
July	56	5,856	2,928	10	1,050	525	3	312	156
Total	1,006	92,193	46,096½	20	1,962½	981¼	14	1,329	664½

Forage consumed from February 13, 1865, to August 1, 1365—Forage for beef cattle and sheep.

Date.	Hay.	Bran.	Ground hard bread.	Ear corn.	Corn meal.	Fodder.	Salt.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Barrels.*	*Pounds.*	*Pounds.*
February	695,010	61,329	147,717	74,100	------	57,600	3,256
March	1,519,389	55,514	85,260	49,643	------	29,860	2,500
April	1,159,046	37,818	60,631	76,993	------	------	3,000
May	1,768,132	26,763	55,785	17,517	2	------	2,500
June	447,395	11,364	6,000	201,481	2	------	5,000
July	369,199	5,020	6,000	106,000	14	------	4,350
Total	5,958,171	197,808	361,393	525,734	18	87,460	20,606

Recapitulation.

Number of beef cattle received		37,048
Gross weight	pounds	44,005,983
Net weight	pounds	22,002,991½
Number of cattle issued		30,274
Gross weight	pounds	35,943,274
Net weight	pounds	17,971,637
Number of cattle died		124
Gross weight	pounds	147,960
Net weight	pounds	73,980
Number of sheep received		1,006

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Gross weight	pounds	92,193
Net weight	pounds	46,096½
Number of sheep issued		20
Gross weight	pounds	1,962½
Net weight	pounds	981¼
Number of sheep died		14
Gross weight	pounds	1,329
Net weight	pounds	664½

FORAGE CONSUMED.

Hay	pounds	5,958,171
Bran	pounds	197,808
Ground hard bread	pounds	361,393
Corn in the ear	pounds	525,734
Corn meal	barrels	18
Fodder	pounds	87,460
Salt	pounds	20,606

The above amounts are exclusive of the beef cattle and sheep slaughtered at this depot.

Respectfully submitted.

JNO. L. HATHAWAY,
Brt. Lt. Col., and C. S. V.

The following tables show the result of experiments made in November, 1864, by order of Lieut. Col. G. Bell, C. S., upon the following instructions:

"Select two cattle daily, weigh them before killing, and immediately after, keeping each weight of each quarter separate, weigh each quarter of them, keeping, of course, those of the same together on the record, every hour after killing, until the meat ceases to lose weight or you are compelled to issue it in consequence of not being able to keep it from spoiling."

Note the following:

About the average time required to kill a beef.

The temperature of the meat (to be determined by putting the bulb of the thermometer in it) immediately after it is killed, and every hour after, until it ceases to change. The temperature of the atmosphere in which it is hung will also be noted at the same time, and the general character of the weather. The time required for all the animal heat to leave the meat. Also, the time for it to become fixed, rigid, and firm.

Data required from two average-sized cattle, daily: Color, weight of feet, weight of rough tallow, general description, weight of liver, weight of hide, gross weight, weight of heart, weight of blood, weight of head and tongue, weight of lights, weight of other offal, weight of loss (unaccountable), weight of net meat, weight of two fore quarters, weight of two hind quarters. Not included in the above, chucks and shins.

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Report of age, weight, color, etc., of two beef cattle slaughtered by order of Lieut. Col. G. Bell, C. S., Saturday, November 12, 1864.

No.	Age.	Gross weight.	Color.	Condition.	General appearance.
	Years.	*Pounds.*			
1	4	1,420	Red and white	Lean	Rawboned.
2	5	1,000	Red	Lean	Round.

WEIGHT IN POUNDS OF HEAD, HEART, HIDE, ETC.

No.	Head and tongue.	Feet.	Liver.	Heart and kidneys.	Lights.	Rough tallow.	Hide.	Blood.	Other offal.	Chucks.	Shins.	Net meat.
1	42	23	15	12½	11½	164	135½	57	239	34½	18	710
2	34	13½	12	9	10	48	93	47	200	28	13	485

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No.	Time.	Temperature.		Time.	Weight.				Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss, in pounds.
		Beef.	Atmosphere.		Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.				
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
1	10.18 a. m.	102	50	10.35 a. m.	218	193	145	154	15	710	692½	17½
	11.18 a. m.	100	53	11.00 a. m.	215	191	144	154				
	12.00 m.	98	56	12.00 m.	214½	190	144	153				
	1.00 p. m.	97	56	1.00 p. m.	214	190	143	152				
	2.00 p. m.	96	56	2.00 p. m.	214	189	142½	152				
	3.00 p. m.	90	52	3.00 p. m.	214	188	141½	151				
	4.00 p. m.	82	52	4.00 p. m.	214	187	141½	150				
	5.00 p. m.	81	50	5.00 p. m.	214	187	141½	150				
	6.00 p. m.	80	49	6.00 p. m.	214	187	141½	150				
	7.00 p. m.	78	46	7.00 p. m.	214	187	141½	150				
	8.00 p. m.	76	44	8.00 p. m.	214	187	141½	150				
	9.00 p. m.	74	43½	9.00 p. m.	214	187	141½	150				
	10.00 p. m.	74	42	10.00 p. m.	214	187	141½	150				
	11.00 p. m.	72	42	11.00 p. m.	214	187	141½	150				
	12.00 mid.	70	41	12.00 mid.	214	187	141½	150				
	1.00 a. m.	66	40	1.00 a. m.	214	187	141½	150				
	2.00 a. m.	66	39	2.00 a. m.	214	187	141½	150				
	3.00 a. m.	66	39	3.00 a. m.	214	187	141½	150				
	4.00 a. m.	65	39	4.00 a. m.	214	187	141½	150				
	5.00 a. m.	63	38	5.00 a. m.	214	187	141½	150				
	6.00 a. m.	60	38	6.00 a. m.	214	187	141½	150				
	7.00 a. m.	60	38	7.00 a. m.	214	187	141½	150				
	8.00 a. m.	59	39	8.00 a. m.	214	187	141½	150				
	9.00 a. m.	59	41	9.00 a. m.	214	187	141½	150				
	10.00 a. m.	56	41	10.00 a. m.	214	187	141½	150				
	11.00 a. m.	56	41	11.00 a. m.	214	187	141½	150				
	12.00 m.	56	42	12.00 m.	214	187	141½	150				
	1.00 p. m.	56	41	1.00 p. m.	214	187	141½	150				
	2.00 p. m.	56	41	2.00 p. m.	214	187	141½	150				

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No.	Time.	Temperature.		Time.	Weight.				Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss, in pounds.
		Beef.	Atmosphere.		Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.				
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
2	10.48 a. m.	102	51	11.10 a. m.	130	133	110	112	20	485	465	20
	11.00 a. m.	100	55	12.00 m.	128	131	108	110				
	12.00 m.	98	56	1.00 p. m.	127	130	108	108				
	1.00 p. m.	94	56	2.00 p. m.	125½	128	106	108				
	2.00 p. m.	88	53	3.00 p. m.	124	128	106	107				
	3.00 p. m.	86	51	4.00 p. m.	124	128	106	107				
	4.00 p. m.	86	50	5.00 p. m.	124	128	106	107				
	5.00 p. m.	82	50	6.00 p. m.	124	128	106	107				
	6.00 p. m.	80	49	7.00 p. m.	124	128	106	107				
	7.00 p. m.	76	45	8.00 p. m.	124	128	106	107				
	8.00 p. m.	74	44	9.00 p. m.	124	128	106	107				
	9.00 p. m.	74	43	10.00 p. m.	124	128	106	107				
	10.00 p. m.	72	42	11.00 p. m.	124	128	106	107				
	11.00 p. m.	68	41	12.00 mid.	124	128	106	107				
	12.00 mid.	68	40	1.00 a. m.	124	128	106	107				
	1.00 a. m.	66	39	2.00 a. m.	124	128	106	107				
	2.00 a. m.	65	39	3.00 a. m.	124	128	106	107				
	3.00 a. m.	64	39	4.00 a. m.	124	128	106	107				
	4.00 a. m.	62	37	5.00 a. m.	124	128	106	107				
	5.00 a. m.	60	37	6.00 a. m.	124	128	106	107				
	6.00 a. m.	58	36	7.00 a. m.	124	128	106	107				
	7.00 a. m.	56	38	8.00 a. m.	124	128	106	107				
	8.00 a. m.	56	38	9.00 a. m.	124	128	106	107				
	9.00 a. m.	54	41	10.00 a. m.	124	128	106	107				
	10.00 a. m.	54	41	11.00 a. m.	124	128	106	107				
	11.00 a. m.	54	41½	12.00 m.	124	128	106	107				
	12.00 m.	54	41	1.00 p. m.	124	128	106	107				
	1.00 p. m.	54	40	2.00 p. m.	124	128	106	107				
	2.00 p. m.	54	40	3.00 p. m.	124	128	106	107				

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Report of age, weight, color, etc., of two beef cattle slaughtered by order of Lieut. Col. G. Bell, C. S., Monday, November 14, 1864.

DESCRIPTION OF CATTLE.

No.	Age.	Gross weight.	Color.	Condition.	General appearance.
	Years.	*Pounds.*			
1	7	1,400	Red	Good	Fair.
2	10	1,510	Red	Poor	Rawboned.

WEIGHT, IN POUNDS, OF HEAD, HEART, HIDE, ETC.

No.	Head and tongue.	Feet.	Liver.	Heart and kidneys.	Lights.	Rough tallow.	Hide.	Blood.	Other offal.	Chucks.	Shins.	Weight of two fore quarters.	Weight of two hind quarters.	Net meat.	Loss unaccounted for.
1	42	22	13	15	9	78	119	66	247	44	18	429	308½	737½	----
2	43	22	16	14	11	96	135	81	256	50	20	441	341	782	----

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No.	Time.	Temperature.		Time.	Weight.				Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss in pounds.
		Beef.	Atmosphere.		Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.				
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
1	9.17 a. m.	100	38	9.35 a. m.	214	215	155½	153	20	737½	725	12½
	10.00 a. m.	98	41	10.00 a. m.	213	214	155	150				
	11.00 a. m.	96	41½	11.00 a. m.	212½	214	154	151½				
	12.00 m.	96	43	12.00 m.	212	214	154	151				
	1.00 p. m.	94	42	1.00 p. m.	211	213	154	151				
	2.00 p. m.	88	44	2.00 p. m.	211	212	154	151				
	3.00 p. m.	86	43	3.00 p. m.	210	211	153	151				
	4.00 p. m.	84	42	4.00 p. m.	210	211	153	151				
	5.00 p. m.	82	41	5.00 p. m.	210	211	153	151				
	6.00 p. m.	80	40	6.00 p. m.	210	211	153	151				
	7.00 p. m.	78	39	7.00 p. m.	210	211	153	151				
	8.00 p. m.	76	38	8.00 p. m.	210	211	153	151				
	9.00 p. m.	74	37	9.00 p. m.	210	211	153	151				
	10.00 p. m.	70	35	10.00 p. m.	210	211	153	151				
	11.00 p. m.	66	33	11.00 p. m.	210	211	153	151				
	12.00 mid.	64	33	12.00 mid.	210	211	153	151				
	1.00 a. m.	60	32	1.00 a. m.	210	211	153	151				
	2.00 a. m.	58	32	2.00 a. m.	210	211	153	151				
	3.00 a. m.	56	32½	3.00 a. m.	210	211	153	151				
	4.00 a. m.	56	32½	4.00 a. m.	210	211	153	151				
	5.00 a. m.	54	32½	5.00 a. m.	210	211	153	151				
	6.00 a. m.	54	33	6.00 a. m.	210	211	153	151				
	7.00 a. m.	52	34	7.00 a. m.	210	211	153	151				
	8.00 a. m.	52	38	8.00 a. m.	210	211	153	151				
	9.00 a. m.	50	39	9.00 a. m.	210	211	153	151				
	10.00 a. m.	50	41	10.00 a. m.	210	211	153	151				
	11.00 a. m.	50	43	11.00 a. m.	210	211	153	151				
	12.00 m.	50	44	12.00 m.	210	211	153	151				
	1.00 p. m.	50	46	1.00 p. m.	210	211	153	151				

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No.	Time.	Temperature. Beef.	Temperature. Atmosphere.	Time.	Weight. Right fore quarter.	Weight. Left fore quarter.	Weight. Right hind quarter.	Weight. Left hind quarter.	Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss in pounds.
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
2	10.05 a. m.	100	40	10.30 a. m.	217	224	170	171	25	782	768	14
	11.00 a. m.	99	41	11.00 a. m.	216	224	170	171				
	12.00 m.	96	43	12.00 m.	215	224	169	169				
	1.00 p. m.	94	42	1.00 p. m.	214	222	168	169				
	2.00 p. m.	90	44	2.00 p. m.	214	222	167½	169				
	3.00 p. m.	88	43	3.00 p. m.	213	222	167	168				
	4.00 p. m.	86	43	4.00 p. m.	213	221	167	167				
	5.00 p. m.	84	42	5.00 p. m.	213	221	167	167				
	6 00 p. m.	82	40	6.00 p. m.	213	221	167	167				
	7.00 p. m.	79	39	7.00 p. m.	213	221	167	167				
	8.00 p. m.	76	38	8.00 p. m.	213	221	167	167				
	9.00 p. m.	74	37	9.00 p. m.	213	221	167	167				
	10.00 p. m.	70	35	10.00 p. m.	213	221	167	167				
	11.00 p. m.	66	33	11.00 p. m.	213	221	167	167				
	12.00 mid.	64	32½	12.00 mid.	213	221	167	167				
	1.00 a. m.	60	33	1.00 a. m.	213	221	167	167				
	2.00 a. m.	58	33	2.00 a. m.	213	221	167	167				
	3.00 a. m.	55	33	3.00 a. m.	213	221	167	167				
	4.00 a. m.	55	33	4.00 a. m.	213	221	167	167				
	5.00 a. m.	54	33	5.00 a. m.	213	221	167	167				
	6.00 a. m.	54	33	6.00 a. m.	213	221	167	167				
	7.00 a. m.	52	34	7.00 a. m.	213	221	167	167				
	8.00 a. m.	52	38	8.00 a. m.	213	221	167	167				
	9.00 a. m.	50	39	9.00 a. m.	213	221	167	167				
	10.00 a. m.	50	41	10.00 a. m.	213	221	167	167				
	11.00 a. m.	50	43	11.00 a. m.	213	221	167	167				
	12.00 m.	50	44	12.00 m.	213	221	167	167				
	1.00 p. m.	50	46	1.00 p. m.	213	221	167	167				

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Report of age, weight, color, etc., of two beef cattle slaughtered by order of Lieut. Col. G. Bell, C. S., Wednesday, November 16, 1864.

DESCRIPTION OF CATTLE.

No.	Age.	Gross weight.	Color.	Condition.	General appearance.
	Years.	*Pounds.*			
1	7	1,460	Yellow	Medium	Rather plump.
2	11	1,450	Red	Medium	Rather plump.

WEIGHT IN POUNDS OF HEAD, HEART, HIDE, ETC.

No.	Head and tongue.	Feet.	Liver.	Kidneys and heart.	Lights.	Rough tallow.	Hide.	Blood.	Other offal.	Chucks.	Shins.	Weight of two fore quarters.	Weight of two hind quarters.	Net meat.	Loss unaccounted for.
1	43	22	12½	13	10	98	114	67	252	48	19	420	343	763	------
2	41	24	15	13	12	63	125	65	265	41	21	415	333	748	------

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No.	Time.	Temperature.		Time.	Weight.				Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss in pounds.
		Beef.	Atmosphere.		Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.				
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
1	9.15 a. m.	102	40	9.30 a. m.	207	213	169	174	15	763	745	18
	10.00 a. m.	100	44	10.00 a. m.	204	212	169	174				
	11.00 a. m.	98	46	11.00 a. m.	202	209	168	172				
	12.00 m.	96	47	12.00 m.	202	209	168	172				
	1.00 p. m.	94	49	1.00 p. m.	202	209	167	172				
	2.00 p. m.	92	50	2.00 p. m.	202	209	167	172				
	3.00 p. m.	90	50	3.00 p. m.	200	208	166	171				
	4.00 p. m.	90	49	4.00 p. m.	200	208	166	171				
	5.00 p. m.	88	48	5.00 p. m.	200	208	166	171				
	6.00 p. m.	84	46	6.00 p. m.	200	208	166	171				
	7.00 p. m.	82	44	7.00 p. m.	200	208	166	171				
	8.00 p. m.	80	43	8.00 p. m.	200	208	166	171				
	9.00 p. m.	78	42	9.00 p. m.	200	208	166	171				
	10.00 p. m.	76	40	10.00 p. m.	200	208	166	171				
	11.00 p. m.	76	39	11.00 p. m.	200	208	166	171				
	12.00 mid.	74	38	12.00 mid.	200	208	166	171				
	1.00 a. m.	72	38	1.00 a. m.	200	208	166	171				
	2.00 a. m.	70	38	2.00 a. m.	200	208	166	171				
	3.00 a. m.	70	38	3.00 a. m.	200	208	166	171				
	4.00 a. m.	68	38	4.00 a. m.	200	208	166	171				
	5.00 a. m.	66	39	5.00 a. m.	200	208	166	171				
	6.00 a. m.	64	40	6.00 a. m.	200	208	166	171				
	7.00 a. m.	62	42	7.00 a. m.	200	208	166	171				
	8.00 a. m.	60	43	8.00 a. m.	200	208	166	171				
	9.00 a. m.	60	46	9.00 a. m.	200	208	166	171				
	10.00 a. m.	58	48	10.00 a. m.	200	208	166	171				
	11.00 a. m.	58	49	11.00 a. m.	200	208	166	171				

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No.	Time.	Temperature.		Time.	Weight.				Time consumed in killing.	Total weight of beef at time of killing.	Total weight when last weighed.	Loss in pounds.
		Beef.	Atmosphere.		Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.				
		°	°		*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Min.*	*Lbs.*	*Lbs.*	
2	9.45 a. m.	102	41	10.05 a. m.	202	213	168	165	20	748	732	16
	10.00 a. m.	100	45	11.00 a. m.	201	213	167	165				
	11.00 a. m.	98	46	12.00 m.	201	212	167	163				
	12.00 m.	96	48	1.00 p. m.,	201	212	167	163				
	1.00 p. m.	94	49	2.00 p. m.	200	212	167	163				
	2.00 p. m.	92	50	3.00 p. m.	200	212	166	163				
	3.00 p. m.	90	50	4.00 p. m.	198	212	166	163				
	4.00 p. m.	88	48	5.00 p. m.	198	211	164	162				
	5.00 p. m.	84	46	6.00 p. m.	197	210	163	162				
	6.00 p. m.	82	45	7.00 p. m.	197	210	163	162				
	7.00 p. m.	80	44	8.00 p. m.	197	210	163	162				
	8.00 p. m.	80	43	9.00 p. m.	197	210	163	162				
	9.00 p. m.	78	42	10.00 p. m.	197	210	163	162				
	10.00 p. m.	76	40	11.00 p. m.	197	210	163	162				
	11.00 p. m.	76	39	12.00 mid.	197	210	163	162				
	12.00 mid.	74	38	1.00 a. m.	197	210	163	162				
	1.00 a. m.	72	38	2.00 a. m.	197	210	163	162				
	2.00 a. m.	70	38	3.00 a. m.	197	210	163	162				
	3.00 a. m.	70	38	4.00 a. m.	197	210	163	162				
	4.00 a. m.	68	38	5.00 a. m.	197	210	163	162				
	5.00 a. m.	66	39	6.00 a. m.	197	210	163	162				
	6.00 a. m.	64	40	7.00 a. m.	197	210	163	162				
	7.00 a. m.	62	42	8.00 a. m.	197	210	163	162				
	8.00 a. m.	60	43	9.00 a. m.	197	210	163	162				
	9.00 a. m.	60	47	10.00 a. m.	197	210	163	162				
	10.00 a. m.	58	49	11.00 a. m.	197	210	163	162				
	11.00 a. m.	58	49									

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Report of weight, etc., of two beef cattle slaughtered by order of Lieut. Col. Geo. Bell, C. S., Friday, November 18, 1864.

GROSS WEIGHT.

	Pounds.
No. 1	1,690
No. 2	1,610

WEIGHT IN POUNDS OF HEAD, HEART, HIDE, ETC.

No.	Head and tongue.	Feet.	Liver.	Heart.	Lights.	Rough tallow.	Hide.	Blood.	Other offal.	Chucks.	Shins.	Total.
1	47	26	21	15	10	102	138	70	441	50	19	939
2	45	27	20	15	12	130	130	74	280	50	19	802

WEIGHT WHEN SLAUGHTERED.

No.	Date.	Time killed.	Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.	Net.
		a. m.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	Nov. 18	8.15	216	216	165	153	750
2	Nov. 18	8.30	222	238	175	180	815

WEIGHT WHEN ISSUED.

No.	Date.	Time issued.	Right fore quarter	Left fore quarter.	Right hind quarter	Left hind quarter.	Net.
		a. m.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	Nov. 19	9.30	211	212	161	152	736
2	Nov. 19	9.30	217	233	171	176	797

RECAPITULATION.

No. 1.		Pounds.
Gross weight		1,690
Weight of head, etc	939	
Weight of meat, net	750	
	1,689	
Shrinkage	14	
		1,675
Loss		15

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No. 2.

	Pounds.	
Gross weight		1,610
Weight of head, etc.	802	
Weight of meat, net	815	
	1,617	
Shrinkage	18	
		1,599
Loss		11

Report of weight, etc., of two beef cattle slaughtered by order of Lieut. Col. Geo. Bell, C. S., Monday, November 21, 1864.

GROSS WEIGHT.

	Pounds.
No. 1	1,230
No. 2	1,200

WEIGHT IN POUNDS OF HEAD, HEART, HIDE, ETC.

No.	Head and tongue.	Feet.	Liver.	Heart.	Lights.	Rough tallow.	Hide.	Blood.	Other offal.	Chucks.	Shins.	Total.
1	39	20	14	11	10	65	114	53	264	40	16	646
2	39	19	11	9	9	85	124	50	203	36	17	602

WEIGHT WHEN SLAUGHTERED.

No.	Date.	Time killed.	Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.	Net.
		a. m.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	Nov. 21	8.15	162	165	130	133	590
2	Nov. 21	8.20	180	180	133	130	623

WEIGHT WHEN ISSUED.

No.	Date.	Time issued.	Right fore quarter.	Left fore quarter.	Right hind quarter.	Left hind quarter.	Net.
		a. m.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	Nov. 22	10.15	158	160	127	130	575
2	Nov. 22	10.20	176	177	131	129	613

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RECAPITULATION.

No. 1.		*Pounds.*
Gross weight		1,230
Weight of head, etc	646	
Weight of meat, net	590	
	1,236	
Shrinkage	15	
		1,221
Loss		9

No. 2.		*Pounds.*
Gross weight		1,200
Weight of head, etc	602	
Weight of meat, net	623	
	1,225	
Shrinkage	10	
		1,215
		*1,215

Respectfully submitted.

JNO. L. HATHAWAY,
Bvt. Lieut. Col. and C. S. V.

OFFICE COMMISSARY OF SUBSISTENCE,
ELMIRA, N. Y., *June 28, 1865.*

SIR:

I have the honor to state in answer to your circular letter of the 1st instant that my experience only comprised a portion of the points mentioned in that circular, viz, the supplying of a corps or brigade in the field and the supplying of a large depot for troops and prisoners of war. I will endeavor to give you my views and experience on these points as far as I am able.

1. The first duty of a corps or brigade commissary is to know the exact number of the command with which he is serving, and as far as possible what additions or diminutions it may be subjected to; he should then ascertain the exact amount of transportation he can receive for the subsistence stores, and always insist upon having as much as the circumstances of the case will admit, for without sufficient transportation it will be impossible to subsist the troops, if the command is large, unless the country is very productive and

* Probably some error in weights.

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abundantly supplied through which it may pass. An army of thirty or fifty thousand may be partially supplied by the country through which it passes, but when it comes to supplying one of a hundred or a hundred and fifty thousand men the supplies must be drawn in great part from a distance and kept up in a regular way; mere foraging in the country will not suffice.

2. In marches it is almost impossible to carry more than the simplest marching or fighting rations, viz, pork, hard bread, sugar, and coffee, and sometimes the pork has to be left out and the supply of meat consist of fresh beef, driven on the hoof with the command. In the marches of the army of the Potomac I have, however, always been able to carry at least two days' supply of salt pork in five for the command, which is always a very desirable quantity, as it happens often on a march that the cattle can not be conveniently slaughtered, or the meat cooked by the men.

When troops come into camp for a few days the commissary should then use his best endeavors to furnish them with all parts of the ration to which they are entitled; beans, especially, for unless this is done the men will soon be found to run short in their rations; in fact, troops on a march will generally be found to be several days behindhand if the march is continued eighteen or twenty days, and will have to be supplied by special requisition upon coming into camp. During an engagement, should it become necessary to supply the troops, I have found it best to load a few wagons with an assortment of stores and bring them as near the line as possible and so issue to the men. At the battle of Malvern Hill, the men having been out of rations by reason of their long engagement and it being impracticable to have the train near the line, I provided the teamsters and others in the commissary with grain sacks, obtained from the battery wagons, filled with pork, hard bread, sugar, and coffee, and conducted them on horseback to the batteries in position and so supplied them.

In winter quarters, when the men are at rest and have ample time to cook and enjoy their food, care should be taken to supply them with every article allowed them by law—soft bread,

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fresh potatoes, and every other vegetable that can be obtained at a reasonable rate and in sufficient quantities. Fresh bread, especially, is a luxury the men much crave. The excellent fresh bread furnished the Army of the Potomac from the bakeries of Alexandria and Washington, during the winter of 1862, '63, and '64, was a great relief and comfort to the men, and no doubt a saving to the Government.

3. In establishing field depots, good dry sites near the command to be supplied should be selected; good hospital tents or paulins obtained to cover the stores when taken from the wagons; and, if possible, the tents should be floored; at all events, the goods should be raised from the ground on skids. A raised platform should also be built, on which lay and cut up the fresh beef when not issued direct from the slaughter pen. In the winter, or if the camp is expected to remain long in one spot, the ground around the store tents should be filled in with stone or logs to prevent it becoming cut up by the constant passage of wagons, in fact, every attention should be paid to keeping stores and depot clean and dry.

4. In movements of the army, when not on the eve of an engagement, the commissary train should follow the troops as near as possible, so as on a halt to supply the men and keep up the number of days' rations required in their knapsacks and haversacks. The cattle accompanying the command can be driven near the column and, as by taking short cuts they can outstep the troops, they can be halted and watered whenever desired. As night approaches they should be halted in some spot where they can feed during the night, which, if not too much fatigued—which is seldom the case—they will do. A sufficient number of men should be detailed to drive and guard the herd at night and prevent their straying. The drivers should, if possible, be mounted, as when cattle become frightened or wild it is impossible for men on foot to keep up with them and prevent their loss. Cattle should, on a march, be slaughtered late in the evening and the meat distributed as soon as possible to the men, who will then have an opportunity to cook it that night or early the next morning before starting on their march. The hides and tallow of cattle slaughtered in the field can generally be turned in at the depot from

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whence the stores are obtained, though sometimes have to be buried on the field with the offal. When the weather is warm and the hides can not be immediately turned in to the depots the salt from the pork barrels can be used to advantage to sprinkle and so preserve the hides. In such cases it is best to fold them up in as small a space as possible and place them in barrels.

5. The best packages for stores of all kinds are good tight barrels; those of the size of pork or flour barrels for wagon carriage are the best, except for vinegar, which, as the issues are small and the men have seldom any vessels to carry their supply in, the package should be of as small a size as possible—not above 10 or 20 gallons at most. Good flour barrels answer very well for beans or peas, but rice, from its weight, should be packed in stronger and tighter barrels, as also ground coffee, as it is very liable to waste. Old whisky barrels answer well for both articles. Boxes of all kinds are bad, as they are more liable to become broken and let in water. The only advantage in the hard-bread box is that it packs easily in wagons, which, from the light weight of the article, it would be impossible to carry the required quantity in barrels from the loss of space.

With proper care stores need seldom become damaged in the field. I do not recollect of ever having stores spoiled while in the field, and have, during the war, received but very little that was unfit for issue; the articles generally were of excellent quality.

7. The simplest efficient marching ration is pork, hard bread, coffee, and sugar; these can be used at all times, the pork without cooking, and a very small fire suffices the soldier to boil his cup of coffee. Pork and hard bread alone is often the marching ration, but as the sugar and coffee occupy but little space and are easily carried by the soldier and add much to his comfort on a march they should, if possible, be added. It often happens that the water obtained on a march is very impure, scarcely drinkable, in fact, but when made into coffee becomes palatable and helps to masticate the hard bread.

8. A soldier can not, with safety, be intrusted with more than eight days' complete rations or ten days' marching rations of

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the simplest kind, and even then it will be found in nine cases out of ten that if the march is long, comprising fifteen or twenty days, and though those number of days may be kept supplied to them from the wagons, that they will be found short by some three or four days' rations at the end of that time. Men will very seldom husband their supplies, especially if the army of which they form a part is large; they think that they are bound to be supplied, and take but little care of what is intrusted to them.

9. An army wagon will carry conveniently, with what forage is usually added, about 2,500 pounds, making with the forage 3,000 pounds, which is about the greatest capacity over moderately good roads; even this amount will be found very great if the march is continued long each day or requires to be at all rapid. This 2,500 pounds will be about equal to 700 complete or 800 marching rations of pork, hard bread, and coffee and sugar. I have, however, found it best in loading large trains of 20 to 30 wagons to place, as far as possible, each article in separate wagons and to mark each wagon with large figures in chalk, keeping a memorandum of their contents, it is then easy to find any portion of the stores desired without overhauling others, and is of special advantage when issues have to be made during the night. In a large train, as many of the wagons will be loaded with the same kind of stores, the loss of one or more wagons will not inferfere with the supply. If, however, the train be small, it would probably be better to divide the stores, so as to have an assortment in each wagon, so if one be lost there will still remain a supply of each article to issue from.

While in the field I was required to make the following reports, viz: Daily report of the number of days' rations on hand, and the number of days' supply of beef cattle on the hoof with the command; weekly report of the number of hides and quantity of tallow turned in the depots; monthly report of the general condition of the department in the command. I required from those serving under me a daily report of the quantity of rations on hand. The daily report to the chief commissary of the army enabled him to know the exact

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number of days' supply in the army and the daily report I received enabled me to furnish my report with exactness.

For field service the simplest cooking utensils, and the fewest that can be made to answer, are the best. A few camp kettles of about 5 gallons capacity and a frying pan or two is all that are needed for each company, and can be carried slung under the wagons, or on a mule. While each man should be provided with his tin cup, knife, fork, spoon, and plate, and also with a small kettle of about 1 quart to boil his coffee in, it not always being practicable to use the large camp kettles, those are all the cooking utensils needed; anything beyond the above-mentioned articles are soon lost or destroyed.

So, also, for commissary property it is best to dispense with all unnecessary tools; anything but what is in constant use is soon lost or destroyed. The following articles are enough to do the issuing to a corps or brigade: One platform scale, one small beam or spring balance scale with large dish, about four scoops, two funnels, two hatchets, two faucets, one meat saw, one cleaver, one butcher steel, and four butcher knives, the latter placed in charge of the men detailed as butchers to be kept always ready for use. It will require also for each regiment or separate command of the corps or brigade, one spring balance, three scoops, one cleaver, one meat saw, and two or three butcher knives to make the net issues of stores received in bulk from the corps or brigade commissary.

Of all antiscorbutics in use, fresh potatoes, when they can be obtained in good condition, I think are the best. They are also the most acceptable to the soldier and should be obtained for issue whenever practicable. A few onions are also very good and should be issued occasionally. Desiccated vegetables are very good also when potatoes and other fresh vegetables can not be obtained, but are not much used by the soldier as they are generally only fit for making soup.

The articles generally required to be purchased with the hospital fund are butter, eggs, and sometimes chickens and fresh milk, though in field service canned meats and condensed milk have been used with great advantage. Canned fruit, especially peaches, are also much used in field hospitals. Post

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hospitals, generally having the advantage of good markets, can be supplied with a greater variety of fresh articles.

The following is the space in cubic feet required to store or load 1;000 rations of each article when packed in the usual way, the boxes strapped and barrels full-hooped.

		Cubic feet.
1,000 rations of pork in barrels		25,850
1,000 rations of hard bread in boxes		43,250
1,000 rations of beans in barrels, 4,300 feet 1,000 rations of rice in barrels, 2,720 feet	One half	3,510
1,000 rations of coffee in barrels, 3,703 feet 1,000 rations of tea in boxes, 1,388 feet	One half	2,545
1,000 rations of sugar in barrels		3,906
1,000 rations of vinegar in kegs		2,200
1,000 rations of candles in boxes		414
1,000 rations of soap in boxes		1,004
1,000 rations of salt in barrels		933
1,000 rations of pepper in boxes		90
Total space required for 1,000 complete rations		83,702

The soldier seems to prefer salt pork to any other kind of meat; the quantity goes further, is easier kept, and can be used in a greater variety of ways than any other, and has the advantage of being used raw. Bacon is also very good in this respect, and when good is very desirable, but it is more difficult to keep, and soon becomes rancid when exposed to the heat on marches or in the field storehouses. Salt beef is but little inquired after, and is, in fact, neither a desirable ration for the soldier or an advantageous one for the commissary to carry, occupying nearly double the room required for the same number of rations of salt pork.

Fresh beef is generally acceptable to the soldier about three days in five, if it can be issued fresh, and he has the opportunity to cook it properly. Soft bread is a luxury which the soldier is always glad to obtain, and should be furnished whenever available. The iron field ovens are very useful when in winter quarters at a distance from any point where the bread can be baked. They do not, however, last long, soon burning out. The article of beans comes next on the order of the ration and is far preferable to peas, rice, or hominy, being much easier cooked than the two latter, and much better liked than the former; in fact, the proportion of rice used does

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not stand hardly as 1 to 10 of beans. Hominy is very little used. Were the soldier allowed more sugar or a ration of molasses he would probably use more rice, but with the present ration his chief vegetable dependence is the beans. Peas I have generally found more liable to spoil by becoming moldy than beans, and are, I think, much harder to keep good. Coffee is a much desired portion of the ration, and used in far greater proportion than tea, the issue being almost 100 to 1. Vinegar is but little used; in fact, not more than half the quantity allowed is ever drawn, and as the article has increased greatly in price within the last few years, a reduction of the issue to about one-half, and the substitution of its value in sugar or beans would be of great advantage to the soldier.

My duties during the past year have been confined almost exclusively to providing subsistence for a large depot for prisoners of war at Elmira, N. Y., the prisoners numbering at one time 10,000. The ration allowed, though much less than that issued to our own troops, was found sufficient, and I believe but little complaint was ever made by the prisoners. This was chiefly owing to the excellent arrangements for cooking and dispensing the food, it all being cooked (the meat, beans, rice, etc., boiled) in large caldrons carefully attended. After the meat and vegetables were taken out, the essence was made into soup. All the food was carefully cut up and distributed, each prisoner receiving his share; nothing was wasted. Soft bread of an excellent quality, the same as that served to our own troops at the station (in fact, much of the bread served to the guard was baked in the prison bakery by the prisoners), was always furnished them. The bakery was worked by one citizen baker and a number of the prisoners as required, who were allowed 10 cents per day for their labor and an extra quantity of food, principally coffee and sugar, for their work. Everything about the bakehouse and mess room was kept perfectly clean and in excellent order.

During the winter of 1864, just past, it was found necessary to issue to the prisoners a quantity of fresh potatoes and onions, the scurvy having appeared amongst them. The issue was 30 pounds of potatoes and 15 pounds of onions for 100 rations, three days in five. This was found very beneficial

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and the disease soon disappeared. The prison fund arising from the difference in the cost of the ration to the prisoners and that to the troops, from the number of the prisoners confined, soon became very large and furnished the means from which the cost of almost everything pertaining to the prison was purchased—lumber, coal, stoves, cooking utensils, straw for bedding, stationery, office furniture, lamps, oil, and in fact every article usually furnished by the quartermaster's department, and I believe at this date leaves a large surplus fund to the prison credit.

In conclusion, I must state that I believe there has been but little trouble for a corps or brigade commissary during this war to keep his command well supplied. The transportation, as a general thing, has been ample, and the supplies at the depots full and sufficient of everything and always under the best management. I have always been able to keep the command with which I served well supplied, for which I feel mainly indebted to the officers in charge of the different depots connected with the army of the Potomac. I always found them provided with ample stores to fill all my requisitions, and never applied for stores that I did not get, and while at my present post of Elmira, N. Y., have always found the officers in charge of the depots from whence I drew my chief supplies always prompt to respond to all my requisitions, while the citizens were at all times willing and anxious to furnish anything that was required at reasonable prices and wait the pleasure of the Government to pay them; in fact, the resources of the country and faith of the people seemed during this war to be inexhaustible.

Very respectfully, your obedient servant,

N. J. SAPPINGTON,
Captain and Commissary of Subsistence.

To BRIG. GEN. A. B. EATON,
Commissary General of Subsistence.

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OFFICE COMMISSARY OF SUBSISTENCE,
CHICAGO, ILL., *June 27, 1865.*

GENERAL:

In answer to your circular letter of June 1, 1865, I have the honor to state that my duties have been at depots as issuing commissary during the four years I have been in the service except the last nine months as purchasing commissary of subsistence at this post.

In issuing I have found that salt pork and shoulders give as good satisfaction to the soldiers as any other salt meat and are much cheaper. Salt beef is not taken by the troops when they can get anything else. Prime mess pork gives as good satisfaction as mess.

I had charge of a good bakery for twenty months at Benton Barracks at which the gains were $40,000, equal to 30 to 33 per cent on the bread baked.

Beans are greatly preferred as the vegetable ration. Peas are very seldom taken and when taken returned as company savings.

I have lost very little meat since I have been in the Subsistence Department. Even with the reduced ration there has been quite an amount of company savings in camp.

Commissary depots should be one story high, as it saves labor and is much more convenient.

Since I have been purchasing I have found that I could frequently buy in open market cheaper than under proposals. Under the latter system combinations sometimes occur.

Advertisements for proposals frequently excite and advance the market.

Very respectfully, your obedient servant,

GEO. W. CAMPBELL,
Captain and Commissary of Subsistence.

To GEN. A. B. EATON,

Commissary General of Subsistence,
Washington, D. C.

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OFFICE COMMISSARY OF SUBSISTENCE,
ROLLA, MO., *June 20, 1865.*

SIR:

Your circular letter bearing date Washington, D. C., June 1, 1865, was received on 18th instant.

In reply I have the honor to submit that, owing to the admirable management of the plans organized and carried out during the rebellion by the superior officers of the Commissary and Quartermaster's Departments to whom was intrusted the feeding of the army, I had no problems to work out in procuring subsistence for the division of which I was the commissary. During the campaign of General Burnside in North Carolina I experienced no difficulty in obtaining supplies for the troops with whom I was serving. I obtained them by making requisition upon the chief commissary of the expedition, and issued them to the regimental commissaries upon their requisitions, first obtaining from the assistant adjutant general of my division the strength of the respective commands, and comparing this statement with the number of men for which they (the regimental commissaries) wished to draw.

By this means I prevented officers having less experience than myself from accumulating more stores than they could carefully or conveniently store or transport, thereby guarding against and preventing any serious loss of stores which might arise from an order for immediate march or movement by rail or other transportation.

In the field I experienced much difficulty in obtaining paulins for the protection of my stores from exposure to the weather, and a good supply of these (almost indispensable) articles I consider very necessary.

I consider it my duty, as commissary of division, to get from the general commanding it all the information relative to anticipated movements, time of, and duration of the march, number of days' rations required for the movement, and all other information possible to secure the success of it. I am pleased to state that General Parke, my commanding officer, always, and in time, gave me such information as to what he wished to have done; that by such confidence I was always prepared to move at the proper time, well provided. If, before going into battle, my duties of providing subsistence, etc.,

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were completed, I would, and did invariably, volunteer my services as aid-de-camp—not that I considered it my duty as a staff officer of Subsistence Department, but from the fact that I thought every mite, however humble, contributed to the suppression and defeat of the enemy. On march I generally accompanied the General, leaving my clerk to move with the train and to guard the stores, as well as to watch the enlisted men, detailed as guard for the train.

I have often thought of the great amount of transportation and expense required for transporting hard bread, but am yet, as I always have been, at a loss to suggest any means of reducing either the one or the other.

The expense of transporting pork in barrels, for long distances over land by wagon, is also very great, and I am satisfied that troops prefer good wholesome bacon to pork, which, in my judgment, might be contracted for and be put up specially for army use in sacks, for economical issue to troops occupying the more northern latitudes of our country, thereby saving a large item in transportation and expense.

For the establishment of a depot, I think it would be advisable or desirable to have several buildings instead of one large storehouse. In constructing it, one building, of one story, might be used for the storage of salt meats, vinegar, and molasses; a second building, of one story, for flour and bread; and a third building, two stories high (if saving of ground be an object), to contain in lower story beans, rice, coffee, sugar, and salt, and in the upper story tea, candles, soap, pepper, stationery, and commissary property. If contiguous to a post, another building should be erected, as an issue room, with capacity of holding one month's rations, to be supplied from the depot. The site should be selected on high, dry, and defensible land, adapted to the easiest access of road, railroad, or steamboat transportation.

At a large depot the clerks should be divided for several duties, say one for cash accounts, one for receiving and transferring stores in bulk, one for issuing on returns, and still another for making out abstracts and returns.

In reference to the movement of stores and beef cattle by sea, river, and rail, I have had no experience. I should, however, have stores shipped and stowed either for sea or river

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transportation in the different parts of the vessels where they would be most free from dampness, heat, or other causes which would tend seriously to injure certain stores; for instance, pork, vinegar, and molasses could be put in the hold, where it is cool, and because dampness would not much injure them; the other stores between decks and in the dryest parts of the vessel. Pork, vinegar, and molasses might (in exceptional cases) be shipped on deck, and if so, they should be covered with paulins, placed over but not bearing on them.

In wagons, loads should be stowed according to the packages and distance to be transported, the condition of roads, etc., the heaviest article, if possible, in the bottom of the bed.

Over very bad roads I would prefer pack mules, equipped Spanish fashion with aparejo, etc., instead of saddles, to wagons, on account of their more rapid movements. I am of opinion that for the war now being waged against the Indians, only such transportation should and can be used to advantage, and that the mules so used should be brought from Mexico or California, such as are accustomed, like the Indian horses, to travel on grass alone, as forage.

Cattle for transportation (sea voyage) should if practicable be shipped in the same manner as horses and mules, each animal in separate stall, with breast strap and breeching to prevent either a forward or backward motion caused by the rolling of the vessel, and if for a long voyage, should be supported by a wide canvas bellyband fastened to the sides of the stalls. Should face inward.

Cattle should always be driven slowly and not overheated. They should not be driven or herded in too large numbers, and should be fed and watered (if kept up) twice a day at regular hours. Before slaughtering them for beef, a scaffold should be erected, with blocks and tackle attached, to raise them from the ground while being skinned, and to keep the meat clean. After skinning, the animal should be thoroughly washed with cold water, until all the blood disappears.

They should never be slaughtered when warm. The hides should be carefully taken from the animal without injury from the knife, should then be well stretched on the ground with wooden pins, and sprinkled with salt or salt and alum.

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Stores in the field should be protected from the effects of the sun and inclement weather by paulins, or planks if they can be procured, and should be stowed if possible the same as if in depot, unless required to be used as breastworks in case of an unexpected attack by the enemy. Pork, vinegar, and molasses would be best stowed in single tiers, but never in more than three tiers high, when the barrels should be separated by scantling or skids placed along near the ends (of the barrel) over the heads, to prevent leakage. All stores should be so stowed that their own weight would cause no damage to the packages. Bacon in sacks should not be put up in large quantities lest combustion occurs, nor should other stores be so stowed as to cause sweating. All should be arranged with a fair chance for full and free ventilation.

I consider that the best packages for pork are half barrels, for easy handling and for transportation. A good pack mule can carry two such packages. Flour and bacon are best in sacks 100 pounds each; hard bread in boxes, with the top, bottom, and sides somewhat stronger than 50-pound boxes now in use; beans, rice, hominy, and coffee in sacks 100 pounds each; tea in half chests, as received from China; sugar and salt in half barrels, 150 pounds each; vinegar in 10-gallon kegs; candles, soap, and pepper in packages, as now furnished. The original packages or sacks for transportation should be recovered with a journey.

I think that the extra expense of handling so many more packages of the above sizes and weights would be fully met by the additional security they afford over layer packages against loss and damage by handling and stowing. Being smaller and lighter, they could be handled with more care.

I think the principal source of loss and damage to stores is on account of the rough handling they receive as a general rule; but sometimes loss arises from the inferior quality of the packages.

I suppose that the most effective means for the hurried destruction of stores would be through the agency of fire applied to camphine, turpentine, or powder, but I have never been so situated that I was compelled to destroy stores to prevent their use by our enemy.

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I consider the simplest efficient marching ration one ration of pork, bread, sugar, and coffee—to 2 pounds.

A soldier could carry with his arms and equipments, in an emergency, five days' complete rations, equivalent to 12 pounds of bread, bacon, beans, rice, ground coffee, sugar, vinegar, candles, soap, and salt, and could carry six days' marching rations as above. Some bodies of men might carry seven days' rations, but I consider that it would be too great a tax upon their physical ability.

An army wagon will carry one day's complete rations for 1,000 men, viz:

	Net weight.	Gross weight.	Bulk, in barrels.
	Pounds.	*Pounds.*	
Pork	750	1,253	4.6000
Flour	1,125	*1,142	5.7989
Beans	150	162¼	0.6666
Rice	100	108	0.5188
Ground coffee	100	122	0.6453
Sugar	150	161	0.6000
Vinegar	80	97	0.4121
Candles	12½	16½	0.0888
Soap	40	44	0.1400
Salt	37½	40½	0.1402
Pepper	2½	4	0.3466
Total	2,547½	3,150¼	13.9573

*Sacks.

And will carry one and one-eighth day's marching rations of following articles:

	Net weight.	Gross weight.
	Pounds.	*Pounds.*
Pork	843¾	1,409⅝
Bread	1,125	1,419¾
Ground coffee	112½	137¼
Sugar	168¾	181⅛
Total	2,250	3,147¾

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Capacity of army wagon body is $60\frac{1}{1}\frac{1}{7}\frac{1}{1}\frac{1}{8}$ cubic feet, or 9 barrels 4 feet 1,224 inches, estimating $6\frac{1}{2}$ cubic feet per barrel, but with proper stowing the amount of rations, complete and for marching, can be handled as above cited.

The reports made by me to my superior officers have generally been concerning my duties as commissary of subsistence: The number of rations on hand at a specified time; period to which the troops have been rationed; amount of funds received, disbursed, and remaining on hand. They have always been made when called for, and especially in the form of a letter. They were made for the object of furnishing such information to the general commanding or the chief of my department, as the case might be, as would show the condition of the division, etc.

Never having been stationed in a section of country furnishing supplies for the army, I have not reported any statistical information regarding capacity and resources.

Supply trains were organized by the Quartermaster's Department, and by order were assigned so many wagons to each division for supplying them with subsistence, and when the army was advancing the train took position with other trains in rear of the troops wheresoever ordered by the general commanding. In retreat the wagons would be sent in advance, and during action would be parked or strung out along the road at a safe distance from the enemy's fire, and ready to move when ordered.

Officers of the Subsistence Department, during sieges, being of the general staff may be assigned to the generals of the trench to transmit their orders and to attend to details of service, after furnishing the required amount of subsistence, having it stored, and arrangements made for its issue. I know of nothing either in regulations or orders prescribing other service.

On board of transports, they should know the amount of stores and when and how stowed, and should occasionally, if practicable, make an inspection of their condition to prevent

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loss by damage from heat or dampness. If there are other duties for service of officers of Subsistence Department on board of transports, I must confess my ignorance.

When subsisting in the enemy's country I would suggest, for effective service, that it would be well to have a certain district of country set apart for each division or corps of the forces and that the different officers of it (the division or corps) should be ordered to report to the chief commissary of subsistence, who should order his subordinates, after having provided them with suitable trains and guards, to scour the district allotted for his field of operations and procure such supplies as he designates or could be found suitable for use. He should also instruct his officers to examine carefully into the amount of stores bought at each house, examine whether other stores have not been hidden in the vicinity, and to take from the inhabitants only such as would not render them subjects for the charity of the United States. Receipts should be given for all stores taken, specifying date, amount, and place, with a view to a final settlement. The stores so taken should be brought in and turned over to the chief commissary of subsistence, or should be issued through his instructions, and always accounted for.

No act of brutality or ruffianism should be exhibited in the exercise of this duty, and the officers enjoined with the performance of it should take all means to prevent such.

To cooking and cooking utensils I have paid no attention, never having had occasion to use or draw the latter, not, however, that I thought the subject unworthy of attention. The proper cooking of the soldiers' rations I consider of the greatest importance, as I attribute much of the sickness created in the Army to the cause of insufficient and bad cooking.

The standard supply of commissary property for a brigade, I would say for one year's supply, is as follows:

For brigade commissary of subsistence, and for each assist-

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ant commissary of subsistence of regiments composing the brigade—

One platform scale.
One commissary chest, containing—
One spring balance, 60 pounds.
One set liquid measures.
One set dry measures.
Two wood faucets.
Two metal faucets.
Two funnels.
Two molasses gates.
Four tin scoops.
One cleaver.
Two hatchets.
One meat saw.
Two meat hooks.
Three butcher knives.
One butcher steel.
One steelyard, 250 pounds.
One liquid gauge.
One bull's-eye lantern.
Two scythe stones.
One field desk.
One and one-half quires envelope paper.
One dozen memorandum books.
One thousand envelopes.
Two gross steel pens.
One ruler.
One inkstand.
Twenty-five quills.
One eraser.
Six sewing needles.
Ten pounds twine.
Two candlesticks.
Two quart bottles ink.
Three bottles red ink.
Two bottles mucilage.
Twelve penholders.
Twelve pieces of tape.
One iron safe (small size).

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If the Department would furnish blank forms for full sets of papers, but little other paper would be required for letters of transmittal, etc. Other property, such as nails for repairing barrels, boxes, etc.; tacks, marking pot and brushes, lampblack, turpentine, paint and paint brushes, etc., I consider it would be difficult to reduce to a standard supply for any definite period.

Pickles, dried apples, fresh onions, and potatoes are articles suitable for issue as antiscorbutics.

The hospital fund supplies many articles of food for the sick, and is usually expended for such articles as the country affords. Chickens, mutton, butter, and eggs are of the more substantial articles of diet, and again tomatoes, oysters, sardines, and various jellies and jams are desirable. The quantity of each would depend altogether upon the health of the patient, and the prescription and authority of surgeon in charge.

Cubic space required for storage of 1,000 rations of each article of the ration, allowing 6¼ cubic feet per barrel, as per table in Subsistence Regulations:

	Space required.		Quantity.
	Ft.	*Ins.*	*Bbls.*
Pork, 750 pounds in barrels	23	756	4.6000
Bread, 750 pounds in 15 boxes 26 by 17 by 11 inches	42	354	9.6000
Flour, $5\frac{145}{196}$ barrels	35	1,509	5.7397
Beans, 150 pounds in barrels	4	287	0.6666
Rice, 100 pounds in barrels	3	419	0.5188
Roasted coffee, 80 pounds in barrels	5	352	0.8326
Sugar, 150 pounds in barrels	3	1,296	0.6000
Vinegar, 10 gallons in barrels	2	994	0.4121
Candles, 12½ pounds in barrels		959	0.0888
Soap, 40 pounds in barrels		1,512	0.1400
Salt, 37½ pounds in barrels		1,514	0.1402
Pepper, 2½ pounds in barrels	2	287	0.3466

The troops are fond of bacon and fresh beef, and like the latter issued three or four times per week. They prefer beans to rice, peas, or hominy, mixed vegetables or desiccated potatoes, and also prefer flour to hot bread, excepting on march.

The present ration might be reduced on every 100 rations issued, 1 pound of coffee and 1 quart of vinegar.

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Company saving should be suspended, and if the ration is so large that a saving can be made to be sold to Subsistence Department it would save time and labor to increase the soldier's pay and reduce the ration to nearly the old standard as issued before the war.

I am, sir, respectfully, your obedient servant,

JNO. N. KING,

Captain and Commissary of Subsistence of Volunteers.

GEN. A. B. EATON,

Commissary General of Subsistence, Washington, D. C.

OFFICE CHIEF COMMISSARY, FIFTEENTH ARMY CORPS,

LOUISVILLE, KY., *July 18, 1865.*

GENERAL:

In compliance with the suggestions made in circular letter, dated "Office Commissary General of Subsistence, Washington, D. C., June 1, 1865," in which occur the following words: "You will please write out and forward to this office the results of your experience in all matters relating to the successful solution of the great problem, 'How to feed an army,'" I have the honor to submit the following as the results of my experience. I shall follow, as near as possible, the points suggested by you, and as nearly as may be in the order of their occurrences in the circular letter:

First. My experience while doing duty as a commissary has been mostly confined either to an army, army corps, or division, and I have been constantly in the field. So far as I am posted respecting an army while lying in trenches during a seige, and also while in winter quarters, the ration as given is sufficient, and with very few exceptions, I think, could not be bettered. Perhaps, for some portions of it, other things might be substituted which would add to the healthfulness of the ration and afford a kind of relish to the men. I would not include rice and peas as a portion of the ration, for the reason that but few men eat them, while they are constantly furnished from the grand depots to the subdepots, at great expense to the Government, and are spirited away and wasted without benefiting the soldier. One prolific source of petty corruption by many company commanders has been the savings made by the men in these articles, it being easy in the

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hurried and loose manner in which accounts are looked up in a great many volunteer regiments for company officers so disposed to take advantage of their position at the expense of the soldier. While others undoubtedly faithfully apply every cent received for the benefit of the service and the comfort of their men, still, from all I have seen of the policy, I should be disposed to consider it radically bad. I would, therefore, think a better ration could be furnished for use while an army is in quarters by abolishing that of peas, rice, and perhaps hominy, and give the men an equal in value of potatoes and onions and of wholesome canned fruits, sauerkraut, and pickles, and abolish entirely company savings. Then everything would be furnished which the men would care to eat, and immense losses would be provided against, as under the present system large quantities of peas, rice, and hominy lie in the subdepot buildings until musty and spoiled or are otherwise wasted in being hauled back and forth from the depot to the camps as company savings.

For marches, if through a country of wealth and cultivation, from what experiences I have had in furnishing an army in motion in a southern latitude, no better plan could be suggested than that included in the orders of General Sherman, previous to moving from Atlanta through Georgia to Savannah and from thence through the Carolinas. These orders limited the supply to half rations of hard bread and sugar and full rations of coffee and salt. But as these orders were seen everywhere and the result is so well known, I will add nothing here.

The second point being one entirely outside of my experience, I will make no suggestions.

In reference to the third point, I venture a suggestion, particularly in regard to clerks. While I was at Hamburg, Tenn., in our movements upon Corinth, and while afterwards at Corinth in charge of subdepot in the field; some of the time I had but one clerk from civil life, and at others two, while for two or three months when I had got far behind with my accounts I for a time employed three. These, of course, were not near enough to do the work, but I could not hire

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more, and felt as if I was stretching my authority by employing even that number, so I had detailed men in the office with them. These men, perhaps, had not been clerks before, and as soon as I could get them trained to clerical habits, so they were not filling my papers with mistakes, they would either be promoted, or their regiments would be mustered out, or be changed to some other command, so I was sure to lose their services just when it seemed they were prepared to be useful to me, and a benefit to the Department. I have often thought it would be better to have good clerks mustered into the service, at stated salaries, according to the responsibility of their positions, and let their improvement and faithfulness be the ground of promotion like an officer; while they would be subject to the pains and penalties of military law if not reliable, and to its risks in times of danger if necessary. This would avoid the jealousy sometimes felt by detailed men toward civilian clerks, and in my opinion give the service more efficient clerical forces at a cheaper rate than at present. For laborers I never found hands better suited to all the varied duties which arise in the Department than colored men.

On the fourth point I have not had sufficient experience in shipping by rail, sea, or river, in comparison with the great experience of others, to give any useful information. I have loaded wagons for the long marches with which I have been connected, and have found the most convenient and safe way, to be as follows: In loading the hard bread on wagons by itself; with care and skill from 40 to 44 boxes can be loaded on a wagon, by having high covers, with the right shape bows and by putting on some extra sideboards 4 or 5 inches high. When loading the sugar and coffee, I have usually done it as follows: First put in a barrel of sugar, then a barrel of coffee, then put in another barrel of sugar, on the side of the wagon with the former barrel of coffee, and another barrel of coffee next to the first barrel of sugar; and thus alternately change them from side to side until the wagon is filled. If a wagon is loaded with all coffee, it is so light a load can not be put on, and the barrels are so large they will not set in the bed, side and side; consequently vacant spaces

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are left in every tier almost large enough for another barrel—this only enabling us to load about eight barrels on a wagon; but as sugar barrels are smaller, a coffee barrel and sugar barrel will usually fit in side and side, by which means twelve barrels can be put on a wagon, and, as the sugar is heavier, by alternately changing every two barrels loaded, the load is kept evenly balanced on the wagon.

As most of my slaughtering has been done on the march without facilities for saving hides or tallow, or getting transportation for them, only in rare cases, and then by the greatest effort, I leave that part of the subject for those whose experience has been at depots nearly or quite altogether.

On the fifth point I have found that a commissary in the field should be supplied with paulins according to his stores and the number of men he supplies; so when he stops at night he can erect a kind of temporary shed under which to issue and have in case of rain. The great source of loss on marches is, first, bad wagon covers; these should always be double, unless new and of the very best material. Second, weak, thin boxes, poorly nailed together, for bread, and badly coopered, flimsy barrels for sugar. For size and capacity for the packages containing the marching ration, hard-bread boxes should contain 50 pounds, sugar barrels about 260 pounds, coffee barrels about 185 pounds, and salt barrels 280 pounds.

On the sixth point I can state nothing of interest, more than to say that if a man expects to destroy stores in the face of the enemy, he must have some very combustible material with which to fire them, as any ordinary fire burning slowly the enemy would easily extinguish it and save most of the stores if near at hand when they were abandoned. This I found true at Iuka, where the military commandant and all the troops left without my knowledge, and I staid and worked between two and three hours (the enemy not getting in) and then had to leave the stores mostly undestroyed.

On the seventh point there is no more simple and efficient marching ration than that prescribed by General Sherman in his order for the campaign through the Carolinas from Savannah, in January, 1865.

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On the eighth point, in my opinion, no soldier should carry more than two days' *complete* rations, and these of the ordinary marching ration. However, in starting on a campaign, to add as much as possible to limited transportation, he might carry five days of the marching ration for the first five days. That was frequently done by General Sherman's army.

On the ninth point, so far as my experience goes, I have found that an army wagon will haul from 700 to 800 complete rations if well packed, and 1,200 of the ordinary marching ration.

On the tenth point I have said all that I know of any interest in my answer to the fifth and ninth points.

On the eleventh point I would state that besides my ordinary reports to the Departments at Washington I also made a periodical report to the army commissary as often as he required it, which was limited by the frequency with which he was obliged to make reports to the army commander or to the chief commissary of subsistence of the military division. I inclose a copy of the form I usually adopted hereto attached (marked "A"). To do so I required from the commissaries of divisions reports usually made in a similar form. I also made a report of this kind to the corps commander as often as required. I also made a monthly report of the commissaries on duty in my command, their rank and duties, when their last reports were made out, amount of money on hand, etc. I used a form, a copy of which is hereto attached (marked "B"). To obtain the required data upon which to make this report, each of the subordinate commissaries were required to make a report to me of a similar nature.

On the twelfth point my experience confirms the opinion that each division of troops on the march should take care of its own supply train. If the supply train is along with the division to which it belongs, the troops when marching along the flanks through the fields and woods will always see the necessity of building corduroys and lifting the wagons out of mud holes, and there is always sufficient force at hand to do it expeditiously. In times of action General Sherman usually had all the trains of an army or corps consolidated and guarded, somewhere in rear of the army, by a brigade

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or division of troops, according to the strength and disposition of the enemy. I never was connected with but one command which was obliged to retreat, and that was a small force at Iuka in 1862. The train (what there was of it) was sent out in the early evening, I believe, under a small escort, while the troops moved about 2 o'clock a. m., and kept the train constantly some distance in front until their arrival at Corinth, the place of destination.

On points numbered 13 and 14 I have had no experience of value in comparison with others in the Department.

On point No. 15, my experience has been quite extensive, having subsisted the left wing of the Sixteenth Army Corps, in Middle Tennessee, several months during the winter of 1863–64, and also been much engaged in the business of subsisting the Fifteenth Army Corps during its long marches through Georgia and the Carolinas.

During the operations of General Dodge in Middle Tennessee, his command was entirely subsisted from the country, with the exceptions of sugar and coffee required. Under an order from General Dodge the people in the country reported to me the amount of corn, wheat, meat, etc., they had on hand, and then I apportioned it between the Government and themselves, including their negroes, and gave them vouchers under orders from General Sherman. This was the fairest way, and worked the best to all parties, so long as it was the policy to pay for provisions, of any I ever saw. I used all the mills in the country to grind wheat and corn every day in the week except Saturday, when it was understood the citizens could come in and get their grain ground. On General Sherman's campaigns most of the provisions were gathered by details of men from each regiment, or brigade, under the command of a commissioned officer, all mounted on mules and horses, thus enabling them to ride off on the flanks several miles and carry in their stores on their animals. These parties were known in the Army as "bummers." While this was eminently effective so far as procuring food was concerned, it necessarily resulted frequently in outrages more or less inhuman, as so many officers could not be detailed from a great army without there being some very inefficient and

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bad men among them. But so far as I can see, this was the only way General Sherman could adopt to sustain his army in the long marches he made through the enemy's country with his limited transportation. Officers in the Subsistence Department ran mills every night, and sometimes one commissary would be running two or three mills. If the head of the column reached a mill at night, the commissary with the advance division always had a detail ready, and would start the mill as soon as he reached it, and send out teams to haul in corn and wheat. He would also look up all the mills for several miles around, and send out details to take possession of and run them. The next morning when this division had fairly moved out, and began to get out of reach, the commissary would withdraw his detail in time to overtake his command at night, and some commissary with a division in the rear would take the mills he had left and go through the same process. By this means the Fifteenth Army Corps was more than half supplied with bread. The commissaries also picked up and drove along a great many cattle, insomuch that they lasted several weeks after our arrival in Savannah, and also again during our stay in Raleigh, N. C.

In relation to points 16 and 17, as I have been principally connected with a moving army, which gets along with a very limited supply of commissary property, I can tell nothing which would be of any value.

On the eighteenth point I am clearly of opinion that green antiscorbutics are far better than desiccated, even though the troops get them in less quantities.

On point 19, so far as my experience goes, the articles generally required to be purchased with the hospital fund are things of an antiscorbutic nature. Surgeons usually call loudly for canned fruits, especially berries and tomatoes. Also fresh potatoes are a great object, and occasionally something like soda crackers. I can not say what amount would be required for 1,000 men per month, as I always limited surgeons to the amounts of their hospital credit, when I could keep up my accounts sufficiently close to know what it was; I know it was not usually as much as they seemed to require.

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The twentieth point can be so much more accurately answered by a depot commissary that I pass by it entirely.

On the twenty-first point of inquiry, I have found that bacon and salt pork are preferred as meat, unless in camp, and then troops like a portion of fresh beef. The objection to beef on the march is that it does not keep as well and they have not facilities to properly cook it, and when getting into camp late at night it is hard to hunt up the corral for meat. The soldier can take a piece of fat pork or bacon, and eat it raw with a hard cracker, while resting on the road, and it strengthens him and renews his courage for the march. Most new troops dislike hard bread, but after several campaigns they prefer it to soft, as the poor bread they bake out of flour is not only sickening but does not hold out like hard bread and produce the required nourishment.

Sugar is always seized with avidity, and coffee is absolutely indispensable and is always greatly preferred to tea. Beans are invariably taken and eaten, and troops always wish their ration of beans was greater than it is. Vinegar is always wanted. Candles and soap in camp invariably, and a little soap on the march ought always to be furnished. Salt is about the right ration, and troops are always delighted with the pepper ration. When troops are marching, especially with light transportation, they should have roasted and ground coffee, but in quarters I would get green coffee if possible, as it is full better coffee; after being roasted it acquires a musty taste, and loses its strength. Troops do not like peas or rice and care but little for hominy. They do not know how to cook peas and never have patience enough to learn. Rice they consider good for an invalid but not a soldier, and hominy they care but little about, as they do not know how to cook it properly, I presume. Desiccated potatoes and mixed vegetables they will not touch in the field, and use it but partially in camp, and I presume would not do so at all if they could get half the amount in some fresh vegetable. They do not know how to cook them, and they take more seasoning than they have skill or means to give them.

Now that the military establishment is being materially diminished, so that the country can produce and transportation can be obtained for fresh vegetables for what will remain

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of the army, I should think it would be wise policy to cut off those portions of the ration not so well liked by the army, and give them a good ration of potatoes and onions. As the army will be so small, with judicious management fresh vegetables can be supplied and but few wasted by rotting, etc., in comparison to what was lost when the army was at its maximum.

This communication has sometimes descended into a personal narrative which is not intended as autobiography, and I hope will not be ascribed to personal egotism. It was the best way I could tell it.

After all theories, it requires work, energy, and untiring perseverance in a commissary to successfully feed an army.

Very respectfully, your obedient servant,

C. C. CARPENTER,
Lieut. Col. and Chief Commissary of Subsistence,
Fifteenth Army Corps.

BRIG. GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

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A.

Inventory of subsistence stores on hand at the ——, 1864. Estimate of amount required to subsist ——.

	Salt beef.	Salt pork.	Bacon.	Hams.	Shoulders.	Flour.	Pilot bread.	Corn meal.	Beans.	Peas.	Rice.	Hominy.	Coffee. Green.	Coffee. Roast.	Tea.	Sugar.	Vinegar.	Candles.	Soap.	Salt.
	Lbs.	*Bbls.*	*Lbs.*	*Lbs.*	*Lbs.*	*Bbls.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Galls*	*Lbs.*	*Lbs.*	*Lbs.*
Amount required																				
Amount on hand																				
Amount to be supplied																				

	Fresh potatoes.	Desiccated potatoes.	Onions.	Mix vegetables.	Pepper.	Molasses.	Additional articles. Whisky.	Pickles.	Kraut.	Cod fish.	Mackerel.	Dried apples.	Dried peaches.	Oysters.	Tomatoes.	Peaches.	Eggs.	Butter.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Galls*	*Galls*	*Galls*	*Galls*	*Lbs.*	*Kits.*	*Lbs.*	*Lbs.*	*Doz. cans.*	*Doz. cans.*	*Doz. cans.*	*Doz.*	*Lbs.*
Amount required																		
Amount on hand																		
Amount to be supplied																		

I am issuing to—
Troops ——
Citizens ——
Contrabands ——
Total ——

I have issued to them to April ——

I am required to keep on hand —— rations.

—— ——, *C. S. of Vols.*

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[Indorsement.]

A.

FORM OF INVENTORY OF SUBSISTENCE STORES ON HAND.

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B.

List of officers on duty in the Subsistence Department ——, during the month of ——, 1865.

No.	Names.	Rank.	Regiment.	Brigade.	Division.	Corps.	Station.	For what accountable.	Remarks.

SIGNED IN DUPLICATE:

——— ———.

——— ———.

NOTES.—The names on this list should be arranged alphabetically and according to rank, the highest rank first. When all the names can not be conveniently entered on one sheet, the list will be continued on two or more sheets, numbered in series.

In the column of "Remarks" it should be noted whether the commissary of subsistence is chief commissary of subsistence of a division or a corps; the date of his reporting for duty; the date of his being relieved; whether he has been on leave; whether he is on sick leave; and, generally, all items of useful information.

The duplicate copy of this list should be retained by the commissary making it, for future reference.

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[Indorsement.]

B.

REPORT OF OFFICERS
ON DUTY IN SUBSISTENCE
DEPARTMENT.

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COLONEL:

The circular letter of the Commissary General of Subsistence of June 1, 1865, calls for "the results of experience in all matters relating to the successful solution of the great problem 'How to feed an army.'"

In the following notes it is proposed to treat only of duties actually performed by, or under the immediate notice of, the writer. Speculation is useless now that every part of subsistence duty has been brought to the test of actual experience.

Every army operating independently must have a depot in which to accumulate supplies as near the scene of operations as practicable. The best sites for depots are well-defended harbors, easy of access from the sea, with a navigable stream or streams reaching into the territory of contemplated military operations. The higher the stream is navigable for seagoing vessels the more valuable it becomes as a military highway. If there are also navigable streams or a good system of railways, or both, into the country from which the supplies are to be drawn, the site would be all that could be desired. Stores could be sent to the depot by sea, by inland water communication, and by railroad. As the army moved into the enemy's country they would be pushed up and deposited in subdepots, if necessary, without transshipment, saving immense labor and delay. Railroads are taken possession of for military purposes wherever found, and where the army is delayed by obstacles that can not be immediately overcome, they are built to facilitate transportation of supplies. In default of railroads or navigable streams, the stores must be hauled on wagons.

Sites for grand depots are usually determined beforehand. There is always at such points abundant authority given to the chief officers of the staff departments to do whatever may be rendered necessary by circumstances, and there is, or should be, appliances of every needed kind to facilitate the dispatch of business.

It is the duty of the Quartermaster's Department to provide storehouses, paulins, or other adequate protection for subsistence stores, but if the subsistence officer waits until he actually needs this protection before applying for it, his

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stores will be almost certain to suffer. The only safe way is to procure and keep under his own control a sufficient number of paulins to protect his stores until storehouses can be erected.

In preparing to establish a depot on unknown ground, particularly at or near a point occupied by the enemy, everything necessary for its service must be taken with the expedition. Even if the point is known to possess certain facilities, it is probable the enemy will make a defense, and compel the occupation of a less eligible site, or if obliged to evacuate immediately, destroy everything capable of destruction that would be of use to the hostile army.

The stores by present regulations are supposed to be got on shore by the Quartermaster's Department, but as that department is supposed to get the stores of all departments on shore at the same time it is desirable that the subsistence officer should commence this work himself at the earliest possible moment. If there are canal barges at hand, a good temporary wharf can be quickly made by anchoring one of them broadside, and as close to the shore as practicable, and laying stringers from the barge to the bank. Or, if the distance is too great, by placing a scow or flat boat between the barge and shore, and building from one to the other. If pontoons with their fixtures can be obtained, the wharf can be completed in much less time.

A very convenient machine for lifting barrels out of barges is made like a carpenter's horse, but about 10 feet high, with a pole some 25 feet long, like an old-fashioned well sweep, made fast under the ridgepiece of the horse and at right angles with it. A hole is bored through one end of this pole and a rope made fast, to which the cant hooks are attached. The other end of the pole has three or four ropes about 15 feet long to haul down by. This machine, worked by four or five men, will lift pork out of a barge at the rate of three barrels a minute. It can be built in an hour by any one that can handle tools.

The stores necessary to be got on shore for immediate issue are piled on skids, each kind separate, and covered with paulins. If the number of paulins is not sufficient to protect all the

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stores, the beef and pork should be covered when the sun is hot, and when it rains the paulins should be removed and placed over the stores most liable to injury from dampness, such as sugar, coffee, bread, etc.

The success of the subsistence officer depends too much upon facilities to be afforded him by the Quartermaster's Department. At grand depots where there is an abundance of everything this dependence is not so serious a drawback. But at subdepots where the quartermaster is furnished with but little beyond what is needed for the service of his own department, there is often delay, annoyance, and unnecessarily hard work. The suggestion is offered with hesitation, because its adoption involves a change from long practice, but without a doubt of its utility, that the appropriation for the Subsistence Department be made to cover the expense of material and cost of building all temporary storehouses and sheds, paulins, blocks and falls, steam hoisters, or animals for hoisting purposes where the work is not sufficient to warrant the expense of a hoister, flat boats for temporary wharves, in fine, everything necessary for the discharge, preservation, and issue of the stores after they are brought to the point of temporary deposit by the Quartermaster's Department.

Subsistence stores. owing to their perishable nature, can not, like ordnance and quartermaster's stores, be collected in time of peace and held in store ready for an emergency. Each post is usually supplied direct from the purchasing officer, and permanent storehouses are not needed beyond the current service of the post. In time of war very extensive storehouses are required, and frequently in localities where at the close of the war they would be of little value. They should therefore be built as cheaply as is consistent with the preservation of the stores. Storehouses can be built quickest from sawed timber and boards, but if in a wooded country they can be erected nearly as quick from timber cut on the spot, and at one fourth the expense. Pine trees, 10 to 15 inches in diameter, are cut into lengths of 13 feet and split through the center. The ground for the building is prepared by digging a trench 18 inches deep, and wide enough to receive the logs, which are set up perpendicularly, close together, bark

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side out, and the earth shoveled in and tamped hard. One end of the log should be sawed or chopped square, and as they are put up the logs kept on the same level by shoveling earth into the trench or digging it deeper as may be required. Openings of sufficient width are left for the doors. No windows are required. Plank is spiked to the upper end of the logs all around the building, and cross-ties and rafters put on in the usual way, the ties about 5 or 6 inches in diameter and the rafters 3 or 4. The floor is raised 3 feet 6 inches from the ground by blocks 2½ feet thick, upon which are laid timbers 6 inches in diameter, lengthwise of the building, close to the walls. Upon these last are laid floor beams, 6 inches in diameter, across the building. The floor timbers should be not more than 3 or 4 feet apart, which will admit of using nearly all the short pieces of boards for the floor. For a building 125 feet long, two doors on each side and one at each end about 6 or 7 feet wide are sufficient. The best width for the building is 20 feet inside. If wider than this it will be difficult to get boards long enough to give the roof a proper pitch. It will contain six tiers of barrels lengthwise, three on each side, leaving a passage through the center of 5 feet. Or the barrels may be piled in double tiers, marked heads out, with sufficient space to take the quantities. (Neither this nor the passage through the center will be necessary if the suggestion hereinafter to be made of uniform weights and dimensions is adopted.) Open passages should be left from door to door across the building. Six thousand boxes of bread can be stored in one of these buildings if piled as high as the plates, or about 8,000 if carried to the ridge. Five of these will hold a million complete rations exclusive of pork and beef. These buildings have been put up by two or three colored carpenters, assisted by men taken from a gang of ordinary colored laborers. The only tools used were two or three saws, half a dozen hatchets, an iron square, axes, and spades.

The location of storehouses depends upon circumstances. Where there is sufficient water to admit vessels within a few yards of the shore, storehouses can be erected broadside to the channel or river, and near or partly upon the wharf; and the stores rolled from the vessel directly into the building. The

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buildings can be of any desired length, and if made of sawed timber and covered with shingles or some roofing material other than boards, of any convenient width. An additional building parallel with the first can be erected, if necessary, with space between for a double railroad track, and stores passed from the first to the second by means of movable bridges, made of a couple of wood horses and gang planks. The floors of these buildings should be on the same level with the floor of the rail car, 45 inches above the track. Or, if this would make the height on the water front inconvenient, planes of easy inclination can be built by which to roll the barrels to the railroad platform. The inland side of the second building should, if possible, be left free of tracks and obstructions of every kind; and if the soil is such as to make deep mud the vicinity of the building should be planked or corduroyed. Each door should have a platform a little wider than the opening and projecting 4 or 5 feet from the building. (It is better, if practicable, to have the platform the whole length of the building). A movable platform is made the width of the door and about 6 feet long, with strong legs on the outer end, long enough to make it level with the permanent platform. The wagon is drawn alongside the platform parallel with the building, the rear end opposite the farther edge of the door. The movable platform is pulled out and the barrels rolled from it into the wagon. When one wagon is loaded, the platform is shoved in and another drives up. This saves all backing, the cause of much delay and very trying on the teams when the mud is deep.

If it is necessary to carry the wharves some distance into the stream a railroad will be required to bring the stores from the head of the pier. In this case it is better to select dry ground for the storehouses, in the immediate vicinity, where there is plenty of room for additions and the movements of teams. It is little trouble to built 100 or 200 yards of additional track. The business will be removed out of the way of the other departments, and delays and confusion prevented.

The stores are placed in the building according to kind, and so arranged that the longest on hand shall be issued first. When new stores are received, new piles must be commenced,

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and the issues continued on the old piles until they are exhausted. Barrels are usually piled four tiers high, except pork and beef, which should not be more than two, and always on skids with the bilge free. It is better to leave these articles out of doors, covered with paulins, than to pile them in high tiers. Stores in boxes, such as bread, soap, candles, etc., can be piled any convenient height. It greatly facilitates issues to have an assortment of stores in each building, with the date of receipt printed or chalked above the piles; beans, coffee, and sugar in one building; pork, beef, and vinegar in another; candles, soap, pepper, etc., carefully separated in distinct piles.

For discharging vessels a steam hoister is the best arrangement. In default of this, a mast set in the wharf, with a swinging boom attached can be used. It should be rigged with patent-sheeve blocks. If the machine is worked constantly, two animals are required to relieve each other. Two of these machines working ten hours a day will discharge sufficient stores for an army of 150,000 men.

Duties.—Let it be supposed that an army of 100,000 men are supplied from the depot; including employees, say 125,000 rations daily. This will require two receiving clerks, three transfer or tally clerks, and three clerks in the office, one of the latter making issues of commissary property and one invoices and receipts in addition to other duties; one stevedore, and 250 to 300 laborers. The above numbers may look small to some officers, but the writer has issued 60,000 rations daily, in wagons, direct to division commissaries, and part of the time to brigades, with one receiving clerk, two transfer clerks, and two clerks in the office, 50 hired men, and a detail of 100 soldiers. The office duties were much increased by the issue at the same time of both soft bread and fresh beef to the whole force. One hundred thousand rations could have been issued without any special strain after the facilities for receiving and issuing were perfected.

As the number of clerks here given is the minimum, one additional can be usefully employed for various purposes about the depot, and held ready to supply the place of those temporarily absent or sick. The duties require constant

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attention, and the clerks must be competent and devoted to their work. Double the number of indifferent clerks would not perform the duties satisfactorily, nor will any number, good or bad, conduct the business properly without the constant personal supervision of the officer in charge.

The laborers are divided into gangs of, say, fifty each, under one of their number selected for his intelligence and faithfulness, and who should receive two or three dollars more per month than the other hands. A sufficient number of coopers can usually be picked out of a gang of colored laborers who should also receive a few dollars per month more than common hands. If coopers can not be obtained in this way, white mechanics must be employed, as cooperage is indispensable with present packages. The stevedore has charge of the laborers and superintends discharging, loading, and piling the stores in the warehouse; sees that the packages are handled carefully and placed according to the orders he may receive; keeps the men's time, etc. He should be a very energetic person, devoted to his business, and reliable in every way. The transfer clerks select, say, ten men each for loading wagons, and keep them for the special duty of loaders. When loading cars or vessels more men will be needed, who can be taken from the general gangs. Those not required for loading purposes are employed in discharging. There should be a good man kept in each storehouse during the day to see that nothing is improperly taken out, and three or four reliable men employed as night watchmen. Sentinels are not to be relied upon. They will steal themselves or allow others to steal, unless taken from old and well-disciplined troops, particularly whisky. Enough is sometimes lost in a single night to pay the watchman a month.

Each clerk has a memorandum book marked with his name, on which is entered the date of each issue or receipt, the name of the vessel and of the officer from whom received or to whom issued, the number of packages if of uniform weight, or the weight of each package with the tare separately if otherwise. As soon as a vessel is discharged the memorandum is sent to the office and a receipt given to the master for the number of packages actually received. When an issue is

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completed the person who receives the stores on the part of the officer should sign the memorandum of the clerk. If the stores are sent by water the master of the vessel should sign the memorandum, as well as the bill of lading, as soon as the stores are on board. If by railroad, the car doors should be locked when loaded and a paper pasted on each car, with the number of the car, name of the officer by whom sent and to whom to be delivered, with the date, kind, and quantity of stores. At the close of business for the day, or immediately upon the completion of the issue, according to circumstances, the memorandum is taken to the office and entered upon the invoices, or charged to the officer in the "transfer book." It is necessary that stores sent to a distance by water or rail should be invoiced at once and the invoices sent with the stores, or direct by mail, or through the Quartermaster's Department, where there is no mail route, or by an orderly if the distance is not too great. Where the army is stationary, as in a siege, and the issues are frequent, it is more convenient to open an account with each officer, making the invoice, once in seven or ten days. Each invoice should state on the margin the name of the vessel or numbers of the cars or wagons.

At the close of business for the day all the receipts and issues are entered on a "daily abstract of receipts and issues" and the balance remaining on hand stated, from which is made the "daily report of stores" for the information of the chief commissary. The balance should be compared at least once a week, or oftener if practicable, with an actual inventory of the stock, and corrected, if necessary.

The whole of the current business of each day should be completed on its own day, even though it should require an hour or two of night work. If the work of to-day is allowed to encroach upon that of to-morrow, there will be hurry and consequent mistakes and omissions, and in a very short time no positive knowledge of the state of the business.

Strength of packages.—Packages for subsistence stores should be of sufficient strength to bear the following movements without loss of stores or cooperage en route except from accidental causes: From place of purchase, on vessels, or otherwise, to grand depots; discharged, stored, and reloaded

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on vessels or cars for subdepot; discharged, stored, and reloaded on cars or wagons for field depot; discharged, piled or stored, and reloaded on wagons for distribution to the troops. The package should be sound and the contents entire when received by the officer who opens it for issue. In many instances stores will not be moved as often as this, but enormous quantities have, during the present war, taken the precise course here indicated.

Present packages for pork, beef, mackerel, hard bread, tea, coffee, candles, soap, pepper, whisky, vinegar, and molasses are sufficiently strong, and generally those for bacon and ham. Those for flour, corn meal, sugar, beans, hominy, and salt are too light. The stave should be stronger, and every barrel should have at least one (better, two) iron hoops on each end. Flour-barrel size (25½ inches high, 19½ inches bilge, 16½ inches head), made of well-seasoned oak staves, should weigh 28 to 30 pounds, instead of 18 to 20 pounds as at present. It is thought that the extra expense of these packages would be more than covered by a decrease in the percentage of loss in transportation, expense of cooperage, and delay caused by broken packages. It is no unusual thing with present barrels to find in 500 of brown sugar, beans, or corn meal 200 that can not be removed from the wharf without cooperage, many of them so broken as to render necessary the removal of their contents into other barrels.

Uniformity in dimensions and weights of packages.— Barrels for pork, beef, ham, bacon, smoked beef, and mackerel might be of the same dimensions as those of present pork barrels; for flour, corn meal, rice, hominy, sugar, coffee, beans, and salt, same as present flour barrels; soap, candles, and pepper, same size; vinegar and molasses, 10-gallon kegs. This would greatly facilitate stowing both in vessels, storehouses, and wagons.

The weights of contents should be uniform for the same article. Every barrel of pork contains 200 pounds. So every barrel of beans might contain a fixed quantity for that article, and every barrel of sugar a fixed quantity for sugar, and so on through the list. The barrel recommended above, size of present flour barrel, would give net weight about as follows:

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Coffee, 131 pounds; brown sugar, 270 pounds; beans, 220 pounds; rice, 222 pounds; hominy, 200 pounds.

There might be some difficulty in securing uniformity in both dimensions and weights of ham and bacon, and perhaps sugar. The slight variation necessary should be in dimensions, the weights remaining fixed. As a rule, all losses of stores from broken packages are finally borne by the Government. It is rare indeed that the value of such stores is collected from anyone. Any system, therefore, which will lessen those losses must be desirable. With good packages and uniform weights it can be seen how simple and certain would become the duties of receiving and issuing stores. The name of seller, or contractor, purchasing officer, and date of purchase should be distinctly marked on every package; the article on both heads of every barrel and both ends of every box.

Marching ration.—Three-fourths of a pound of bacon, ham, or smoked beef (half ham or bacon and half smoked beef); ¾ pound of hard bread; full rations of coffee and sugar; half rations of salt. Hard bread might be made in thicker crackers; more like navy bread, say, eight to the pound (six to the ration), and the coffee and sugar put up in 100-ration bags; salt in bags of 15 pounds (400 rations) and packed in barrels. Every soldier should be provided with three bags, large enough to hold ten days' rations each of coffee, sugar, and salt. This would require no commissary property beyond a single scale beam and weights to each commissary. The issues could be made with the greatest rapidity and without wastage. It is probable that the method of putting up stores in packages of 100 rations, more or less, might be extended to most parts of the ration, with benefit to both the Government and the issuing officer. Its advantages would be great rapidity, a saving of at least one-half in the labor of issuing, and no loss. The commissary property required for a division of 10,000 men could be carried on one man's shoulder.

The number of rations that a soldier can carry on his person is as follows:

	Pounds.
Weight of present knapsack, one wool blanket, one wool shirt, one pair stockings and one pair bootees	11.00
Weight of ten days' rations hard bread (¾ pound)	7.50
Weight of ten days' rations bacon or smoked beef	7.50

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	Pounds.
Weight of ten days' rations sugar	1.50
Weight of ten days' rations coffee	0.80
Weight of ten days' rations salt	0.19
Weight of soap	0.50
Total (exclusive of arms and ammunition)	28.99
Weight of five days' rations of hard bread	3.75
Weight of five days' rations of bacon or smoked beef	3.75
Weight of five days' rations of sugar	0.75
Weight of five days' rations of coffee	0.40
Weight of five days' rations of salt	0.10
Weight of soap	0.50
Weight of knapsack and clothing	11.00
Total (exclusive of arms and ammunition)	20.25

The present haversack is in the way of the soldier's movements with only two days' rations, which is about all that it will contain, and is moreover too convenient of access. Young soldiers are constantly eating on the march, throwing away about as much as they eat, and the rations are exhausted in half the time for which they were drawn.

The knapsack should have a lining of strong cloth, that can be taken out and washed, made separate for each end. One end will hold ten days' bread. The lining of the other end should be made in two compartments, one for the meat, coffee, etc., the other for the shirt and stockings. There should be several strong pieces of tape attached to the linings, so that as the rations diminish they can be drawn tightly around what remains to prevent it from breaking up. After two days' march with the present bread carried loose nothing remains but flour and small pieces.

Issues to hospital.—The present method of supplying the sick in hospital might be much simplified. The intention is to give the hospital credit for the cost price of the rations to which it is entitled, and charge it with the value of the stores drawn from the subsistence supplies. As at present, a return is made for two, three, or more days at a time, upon which is entered the number of men in hospital on the day the return is made, the number of rations due the hospital on that return, and the number to be drawn. If there is no previous credit, the hospital can not draw beyond the value of the

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return. If there is a balance due, the hospital can draw any quantity not exceeding the balance in value. The number of rations called for on each return have to be reduced to bulk before being issued. At the close of the month the returns are entered on the hospital abstract, again reduced to bulk and the total quantity charged in the statement of the "hospital fund."

The same result can be reached by a much shorter process, and with the certainty of crediting the hospital with exactly what it is entitled to.

Let the commissary who issues be furnished every morning with an extract from the hospital morning report, showing the number of sick and attendants, certified by the senior medical officer, or the commanding officer, or both. This gives the number of rations for that day, and so on through the month. When supplies are needed the surgeon makes a requisition for the quantity in bulk, certifying that the stores are for the use of the sick in hospital, and the attendants.

The hospital abstract should be ruled for quantities in bulk, instead of rations.

The number of persons, as shown by the certified extracts from the morning reports, is entered opposite each date throughout the month, giving the number of rations due the hospital for that month; the value of which is credited in the "statement of the hospital fund."

The quantities furnished on requisition are entered in bulk and the gross amount charged in the statement.

The purchases, if there are several vouchers, may be entered upon an "abstract of hospital purchases" and the amount of the abstract charged in statement. The number of the vouchers should be the same as those filed with the "abstract of contingencies."

The regulations provide that "when men leave their company, the rations they have drawn and left with it shall be deducted from the next ration return for the company; a like rule when men are discharged from hospital shall govern the hospital return," but it is believed that this rule has not been strictly observed, and that hospitals have usually drawn for every person received, and made no deductions for those transferred to other hospitals or discharged.

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This has been during the war a delicate subject to touch upon, and may be so still. Experience has shown that the fund is ample for all the purposes for which it is intended, when made in exact accordance with the regulations.

Hospital purchases for 1,000 men one month:

6 tons of ice.	145 pounds of crackers.
363 pounds of cheese.	102 cans of tomatoes.
69 gallons of coal oil.	26 gallons of rum.
6 cans of pears.	184 gallons of ale.
9 cans of catsup.	52 gallons of cider.
726 pounds of butter.	27 gallons of sirup.
16 cans of peaches.	23 barrels of apples.
672 dozen eggs.	2 boxes of oranges.
350 pounds of poultry.	2 boxes of lemons.
156 gallons of milk (fresh).	2 boxes of raisins.
60 pounds of corn starch.	2 pounds of cinnamon.
200 pounds of washing soda.	

The above is the average of purchases for 1,000 men at several general hospitals, during the month of April, 1865.

Beef Cattle.—Beef cattle are usually supplied to an army from its own territory. Sometimes they can be obtained from that of the enemy, but no certain dependence can be placed on this mode of supply, as every means will be taken to remove supplies of all kinds out of reach. Whatever can be obtained in this way should be as carefully preserved and issued as though furnished on requisition. Cattle are sent to the army by sea, by inland water communication, by railroad, or driven by land.

Cattle become very expensive when transported to a distance by sea. Many die and all lose largely in flesh, especially in hot weather. When it is necessary to furnish the army in this way the cattle should be sent on steamers (or on a vessel towed by a steamer), and under deck, but above the water where ports can be opened to give them plenty of air. The space allotted to the animals should be divided fore and aft, in the center, by a double row of stanchions and horizontal rails or joists, with space between for feed and water. The side spaces may be separated transversely into pens, and the cattle turned in loose. If it should become necessary, they can be tied. In hot weather, each animal should have, say, 30 square feet. In

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cold weather the space can be diminished. If the animals have plenty of room, and the space is well ventilated, they will require each per day 10 pounds of hay, 5 pounds of oats, and 5 gallons of water. If crowded and badly ventilated, it is better to feed 15 pounds of hay and no grain. If the weather is very hot, it is better to dispense with grain, whatever the other conditions may be. Corn should never be fed on shipboard. Animals loose in a pen will move about considerably, which prevents their legs from swelling, and tends to keep down fever, the principal cause of loss in transportation of cattle by sea. A pen 20 feet square will hold comfortably in hot weather ten to twelve animals; in cool weather fourteen to sixteen. By leaving one pen vacant, the cattle can be changed from pen to pen, and the whole space occupied by them thoroughly cleansed every day. In transportation by river or railroad the cattle are usually not more than twenty-four hours on board and will not need any feed if in proper condition when shipped, and properly taken care of when delivered. They should be watered en route, and if the trip consumes more than twenty-four hours, fed. When the army is supplied over a long line of railway it is better to have depots at convenient distances, where the animals can be discharged and allowed to rest, and others forwarded in their place.

Box cars will hold comfortably eight to ten animals. Both doors should be open to admit air, and the opening secured by planks or joists. Cattle cars carry fourteen to eighteen animals.

In discharging from seagoing vessels, if the wharf is much lower than the vessel, the latter can lie off in sufficient water to prevent the animals from striking bottom, and they can be thrown overboard. After one or two have gone over the others will usually follow of their own accord. They will at once swim to shore, where they can be collected by the herders and kept together until all are discharged This must not be attempted where there is quicksand or a soft muddy bottom.

Cattle are for security kept in a corral at night, and in summer turned out during the day to graze in charge of herders. In building the corral about three acres should be allowed to

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1,000 head of cattle. Rolling ground should be selected, and if partially wooded so much the better. It is desirable to have the corral near water, but it is better to drive the cattle one or two, or even three or four miles to water than to select low flat ground, which is certain to be a mud hole in rainy weather. There should be at least two inclosures, one of about an acre for the sick, lame, and blind as near water as practicable. When an animal becomes sick or lame, he should be at once removed to the sick corral.

When grass fails, hay and grain must be fed, and racks must be built to prevent waste. If there is woods in the vicinity, these can be put up by the herders without any expense.

Posts 8 or 10 inches in diameter are set up firmly in the ground in line, 12 or 14 feet apart, the upper end chopped or sawed square, and about 3 feet above the surface. Upon these, reaching from post to post, are placed timbers 5 or 6 inches in diameter, pinned or spiked to the ends of the posts. A trench is dug on each side about 3 feet from the posts to receive the ends of the poles that form the rack. These latter are about 3 inches in diameter and 8 feet long, placed alternately on each side, close together, one end in the trench resting on the timbers secured to the posts. After the poles are placed, the earth is shovelled into the trench and pounded hard and a log 7 or 8 inches in diameter is placed in the apex of the angle formed by the two lines of poles, and secured to the timbers below. This holds the poles in place and completes the rack. Or the poles can be pointed at one end and driven into the ground. The hay is carried into the corral on wagons and pitched into the rack over the ends of the poles.

These racks should be built on the driest ground in the inclosure. There may be several of them, or one running through the center of the corral, according to the nature of the ground. Racks should never be built near the fence. The cattle crowd at their feed and the fence is apt to be thrown down.

The number of herders required depends upon circumstances; as, whether the country is broken and wooded, or a plain, or

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whether the cattle are delivered to the officers with the troops, or turned over at the herd.

The following numbers are sufficient to take care of the cattle, and deliver them to the officers with the troops, if the army is not more than 10 miles distant:

Number of cattle.	In summer.	In winter.
1,000	20	20
5,000	50	60
10,000	75	100

There should be one chief herder, and two or three or more assistants, according to the number of cattle and the number of separate transfers required.

The herders are instructed daily as to the direction in which they shall go, and the distance from the corral. Their business is to see that the cattle have plenty of water, that the herd is kept together on the ground designated, and that none are lost. To enable them to do this they are all mounted.

Circumstances determine whether or not an escort is necessary in delivering the cattle at the front and its strength.

Fresh beef.—Fresh beef is usually issued twice or thrice a week; never less than twice when it is possible to procure and issue it.

When beef cattle are abundant and fresh beef is the cheapest article of the meat ration and the army is in camp or engaged in a siege, it should be issued as often as consistent with the health of the troops—say every other day.

Fair cattle will average net—say 500 pounds. This will give 25 cattle per month to 1,000 men, including sales to officers and issues to hospitals (1,250 cattle to 50,000 men). A safe estimate is 30 cattle and 10 sheep per 1,000 men per month.

When the army is moving, particularly if marching rapidly, it is not desirable to attempt an issue of fresh beef. Under such circumstances the cattle are necessarily slaughtered almost immediately after the day's march, and the beef issued and cooked, or half cooked, as soon as dressed. It is believed that the benefits expected to be derived from the meat are

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pretty much neutralized by its condition and poor cooking. There is, besides, enormous waste. If there occurs a halt of a day or two, then a ration of fresh beef can be issued to the whole force. For this purpose each corps of 25,000 or 30,000 men can have a herd of 150 animals, which will yield two days' beef. If it is thought that more than this will be required before the general herd can be brought up, a greater number of animals can be taken. The cattle are turned over to the division commissaries to be slaughtered and issued. Each commissary requires a scale beam, half a dozen butcher knives, an ax, a small single-sheave block, and about 40 feet of inch rope. The block can be made fast to the limb of a tree, or a post, and the animal hoisted off the ground to be dressed.

Each corps herd should have six or eight herders, selected from those of the general herd for this duty.

When the army is engaged in a siege, or is in winter quarters, 50,000 to 100,000 men, or more, can be supplied from one slaughterhouse, and every valuable part of the animal saved.

The slaughterhouse can be built as described for storehouses (120 by 20 feet).

About 25 feet of one end can be used for slaughtering and dressing, and the same space in the opposite end supplied with three or four strong plank tables, scale beams, etc., for cutting up and issuing. This leaves about 70 feet in length to hang the beef for shrinkage and cooling.

A "close pen" is built outside one of the end doors, about 20 feet square, into which the cattle to be slaughtered are driven a few at a time. The simplest way to kill an ox is to strike him with the blade of a sharp axe, across the neck directly behind the horns. This instantly renders him powerless. Two or more animals are driven from the "close pen" into the slaughter house, knocked down and bled, the floor being so laid that the blood will run through one side of the building into tanks or tubs.

A wheel and shaft for hoisting purposes is made as follows:

The wheel is 4 or 5 feet in diameter, made of pieces of plank or board, three or four thick spiked together, leaving a hole in the center 4 inches square. The ends of the boards are sawed to approach as near as practicable the circumference

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of a circle of the above diameter. The periphery is made slightly concave to prevent the rope from slipping off. The shaft is a round stick 5 or 6 inches in diameter long enough to reach entirely across the building, dressed smooth. Three feet in length of one end is squared to the size of the hole in center of wheel, and the wheel put on and wedged or spiked to the shaft. When up the shaft is about 11 feet from the floor and about 20 feet from the end of the building. An axle may be cut on each end of the shaft, and grooves of corresponding size in the plates; or posts may be set up under each end and fitted to the axles. A small rope is attached to the wheel, wound several times round the circumference, and carried to a small windlass (a round stick 4 or 5 inches in diameter, and 3 or 4 feet long, with a wooden crank at one end, the frame of which is made fast to the floor and side of the building) about 20 feet from the wheel. The shaft has a rope attached to the center long enough to reach to the floor, with a flat hook at the end, opening about 3 inches. Timbers called "balks," 6 inches in diameter are placed on posts 9 feet 6 inches high. Two of these, parallel and 5 feet apart, form the support on which the "beef trees" rest. They may be extended any length according to the extent of the building.

The "beef tree" is made of hard wood 3 inches in diameter and 7 feet long. There is a cut in the center wide and deep enough to receive the hook attached to the shaft and prevent it from slipping. The ends of the trees are passed through the gambrel, the hook attached and the carcass hoisted by the wheel and windlass into a convenient position for dressing and removing the hide. After the animal is dressed the "beef tree" is pushed on top of the balks, the ends of which should be not more than 18 inches from the shaft, by a man at each end having a pole with an iron hook for that purpose (a crotched stick will answer the purpose).

One set of balks 70 feet long will hold—say sixty carcasses. If necessary, two sets 5 feet apart can be put up in a building 20 feet wide.

Twenty to twenty-five butchers with a slaughterhouse arranged as here described can furnish fresh beef thrice a week to 100,000 men. The tools required are two scale beams,

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500-pounds; ten axes, two butcher saws, three butcher knives, and one steel to each butcher; twelve shovels, six spades, three picks, twelve brooms, six scrubbing brushes with handles. The slaughterhouse and vicinity must be scrubbed out and thoroughly policed daily, the blood and other offal buried in a trench, and covered with at least 3 feet of earth.

The number of teams and laborers depends upon the location of the slaughterhouse. If near a river where water can be obtained without hauling, one team and three laborers to bury the offal is sufficient. If the water must be hauled, an additional team and three laborers will be required. If obtained from a well in the immediate vicinity, three additional laborers without the team.

A chief butcher is employed, who has charge of the slaughtering and delivery of the fresh beef. He should be a practical butcher, energetic, intelligent, and honest.

The fresh beef is delivered at the slaughterhouse, and issued only on the written order of the officer in charge. These orders are made from the requisitions of the several commissaries (division commissaries usually) and entered in a book kept for the purpose. The person who receives the beef acknowledges the receipt on the back of the order. He should be designated by the officer who makes the requisition as the person to receive it. The orders are returned to the office every evening by the chief butcher, compared with the entry and charged to the several officers, or invoiced, as the case may be. The original orders should be carefully filed as evidence in case of disputes. The chief butcher reports at the same time the number of cattle slaughtered and the quantity of beef obtained, and the number of cattle and quantity of beef remaining on hand.

Nothing whatever should be issued, sold, or given away at the slaughterhouse, except upon the written order of the officer in charge. Parts of the animal not issuable should be sent to the place of small issues and sales and there disposed of to the best advantage. When the Government purchases cattle on the hoof the whole animals should be issued.

The hides are cured and the tallow tried and barreled under the direction of the chief butcher. An open shed or a

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building similar to the slaughterhouse should be built in which to cure the hides, try the tallow, etc. The hides should be trimmed—the tail and worthless part of the neck and legs cut off—before being salted. The hide is then spread out, flesh side up, and a thin layer of fine salt applied to every part of the flesh side, particularly where the tail and legs are cut off. Another hide is then laid on, flesh side up as before, and the pile carried up to any convenient height. About 5 or 6 pounds of salt are sufficient for each hide. Care must be taken to keep the piles as nearly level as possible. If the brine is allowed to settle in the center, the edges will not be well cured. Hides will cure sufficiently in three weeks. The salt is then shook off and saved and the hide folded into a package about 18 inches square, hair side out, and securely tied with marline.

Three men can trim and salt 100 hides per day and assist in bundling those that are cured.

The tallow is most conveniently tried in caldrons set in a brick furnace, but if this is impracticable, it can be tried in iron pots of any size or common camp kettles. It need never be lost except for want of transportation. Two men are required—one to watch the kettles and keep an even moderate fire, the other to procure and prepare wood. The tallow is poured while hot into well-coopered pork barrels by means of a funnel and through a hole in the head of the barrel. When filled the hole is plugged The weight of the empty barrel should be marked upon it, and, when filled, the gross weight.

The ration.—Pork is the most reliable article of the meat ration. It is generally good and easy of preservation. Salt beef is not much called for. Its bulk is objectionable. Bacon is well liked, and is a very desirable article on account of its comparatively small bulk in transportation. It requires careful attention in hot weather. If practicable, it should be removed from the packages, the latter cleaned, and the bacon scraped and returned. If this can not be done, holes should be bored in the heads of the barrels to let out the oil, which becomes rancid and spoils the meat. It would be better if requisitions and issues were made so that no bacon would be

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on hand after the month of July in a hot climate. Dried fish is not much called for unless when fresh potatoes are issued. It would be well to exhaust the supply of this article by the 1st of July. Mackerel is always in demand, and will keep all summer when well cured. But little rice is called for except for hospitals, and scarcely any hominy, corn meal, or split peas for issues to troops.

Sauerkraut and cabbage in currie are liked by some troops, but there is no general demand for these articles. Desiccated vegetables, it may be said, are not taken at all.

It is difficult to say why these articles are rejected by the troops. The men give no reason, except that they don't like them. In the armies operating against Richmond, the abundant supply of fresh vegetables has rendered any fair trial of the desiccated impossible. It is not conclusive against them that the men dislike their taste at first. A large number of men detest pork, and actually live for weeks on bread and coffee alone, except on fresh-beef days, but the distaste wears off and pork maintains its place. So it would probably be with mixed vegetables, at least if it were impossible to obtain fresh.

Some parts of the ration are too large. Experience has shown that the following articles are issued in excess of the real wants of the troops, and that the issue for 100 rations might be reduced to the quantity stated: Coffee from 8 to 6 pounds; vinegar, 4 to 2 quarts; adamantine candles, 1½ to 1 pound; soap, 4 to 2 pounds; salt, 3½ to 2 pounds.

The issue of candles might be for the six months commencing October 1, 1½ pounds to 100 rations, and from April 1, ½ a pound, an average of 1 pound to 100 rations.

The value of the above deductions might be added to the ration in molasses and dried apples or other dried fruit.

Packages should be invoiced with the stores, and a hide for every animal received should be accounted for.

Empty packages should be repaired as soon after the contents are removed as possible, heads put in and box covers nailed on, and sent on light vessels to the purchasing officer for sale.

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Books and papers.—The following books are kept:

A cash book, in which is kept a record of all subsistence funds received and disbursed.

A return book, in which is entered a copy of the "Return of provisions." In this book is also kept a record of the receipts and issues of commissary property during the month.

A letter book, in which is copied all official letters sent, and important memorandums.

A requisition book, in which is copied all requisitions for stores and property, with which the invoices of "stores received" are compared, and the balance "due on requisition" found.

A book of stores received, in which is entered the name of the vessel or number of cars, etc., "date of arrival," name of officer from whom received, and the articles and quantities as taken from the bill of lading. Also the date of discharge and the quantities actually received, showing the discrepancies, if any.

A record of property destroyed, lost, etc., in which is entered the articles and quantities destroyed, lost, stolen, etc., with a statement of the attending circumstances signed by the person or persons cognizant of them.

A transfer book in which is entered, in the form of a journal, the articles and quantities transferred to each officer during the day, taken from the memorandum books of the transfer clerks.

A daily record of receipts and issues, made on a sheet of imperial paper, ruled like the return of provisions. The quantities previously on hand are entered, and under these the quantities received during the day opposite the name of each officer, giving the total on hand. Each separate transfer is then entered opposite the name of the officer to whom transferred, giving in the column of "Remarks" the name of the vessel or numbers of cars on which placed for transportation. The difference between the "total transferred" and "on hand" gives the quantities "remaining on hand at close of business for the day." These latter quantities are entered upon the "Report of stores on hand" for the information of the chief commissary.

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A memorandum book is kept in which is entered the quantities of soft bread and fresh beef called for, with the name of the officer, and the date and number of the order directing the delivery.

All records and memorandum books when filled are preserved in the office. The memorandum books of receiving and issuing are habitually left in the office at night.

Tables and reports.—The following reports are made:

1. Dimension and capacity of railroad car.
2. Box car loaded with complete rations—pork, etc.
3. Box car loaded with complete rations—bacon.
4. Box car loaded with marching rations.
5. Army wagon loaded with one article.
6. Army wagon loaded with complete rations—pork, etc.
7. Army wagon loaded with complete rations—bacon, etc.
8. Army wagon loaded with marching rations.
9. Cubic space required for storage of 1,000 rations.
10. Gross weight of 1,000 rations, of each article of the ration.

A. Daily report of receipts and issues.
B. Report of stores on hand.
C Report of fresh vegetables received and issued.
D. Reports of hides, etc., received and accrued.
E. Abstract of issues to sick in hospital and attendants.
F. Extract from morning report of hospital.
G. Requisition for stores for use of hospital.
H. Abstract of hospital purchases.

Respectfully submitted.

W. P. MARTIN,
Brevet Major and Commissary of Subsistence of Vols.

BVT. COL. M. R. MORGAN,
Inspector of Subsistence Department,
Washington, D. C.

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TABLE 1.—*Dimensions and capacity of railroad car (box car as used on military railroads during the war).*

Dimensions (interior measurement): Length, 27 feet 5 inches; breadth, 7 feet 6 inches; height, 6 feet 3 inches; capacity, 20,000 pounds.

Loaded with present packages.	Number of packages.	Gross weight per package.	Net weight per package.	Total pounds, net.	Number of rations.	Gross weight.
Pork	60	340	200	12,000	16,000	20,400
Salt beef	60	340	200	12,000	9,600	20,400
Bacon	60	350	290	17,400	23,200	21,000
Flour	100	217	196	19,600	17,422	21,700
Hard bread	388	65	50	19,400	19,400	25,220
Beans	100	240	223	22,300	148,666	24,000
Rice	80	307	280	22,400	224,000	24,560
Hominy	100	221	200	20,000	200,000	22,100
Roasted and ground coffee	112	190	160	17,920	224,000	21,280
Tea	*425	59	46	19,500	1,300,000	25,075
Brown sugar	80	290	269	21,520	143,467	23,200
Vinegar	†100	212	———	‡2,200	220,000	21,200
Adamantine candles	500	47½	40	20,000	1,600,000	23,750
Soap	240	92	80	19,200	480,000	22,080
Salt	70	300	280	19,600	522,666	21,000
Pepper	800	32	25	20,000	8,000,000	25,600

* Half chests. † Kegs. ‡ Gallons.

STOWED AS FOLLOWS.

Pork and beef.—On the chimes; 15 long, 4 wide, covering the entire floor of the car.

Bacon.—In tiers across the car; 3 wide, 2 high, 24 in each end, 12 between the doors on chimes; total 60.

Flour.—In tiers across the car; 4 wide, 3 high, 48 in each end, 4 between the doors; total 100.

Hard bread.—Boxes on the edge, end of box to end of car; 8 on the floor, 4 high, 32 in tier, 5 tiers in each end (320); in space between the doors, 5 on edge ends toward door, or side of car, 4 high in 3 tiers (60); leaving room for 8 boxes, 6 on end, 3 wide, 2 high, side toward door, and 2 on edge side toward door, breaking joints; total 388 boxes.

Beans.—Same as flour, 100 barrels.

Rice.—In tiers across car, on bilge; 4 wide, 2 high, 4 tiers in each end, 16 between doors on chimes; total 80 barrels.

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Roasted and ground coffee.—In tiers across, on bilge; 4 wide, 3 high, 4 tiers in each end, 16 between doors on chimes; total 112 barrels.

Brown sugar.—Same as rice, 80 barrels.

Tea, half chests.—In tiers across; 5 wide, 5 high, 17 tiers; total 425 half chests.

Vinegar kegs.—72 on chimes covering the floor (15,264 pounds gross weight).

Salt in barrels.—In tiers across; 4 wide, 2 high, 4 tiers in each end, 6 between doors on chimes; total 70 barrels.

Pepper.—In tiers across, 800 boxes.

For the articles of candles and soap, the space is more than sufficient for the weight that the cars should carry. Although the capacity is given at 20,000 pounds, the weights in the foregoing table have been constantly carried on the City Point Railroad.

TABLE 2.—*Box car loaded with complete rations—Pork, etc.*

Articles.	Number of packages.	Net weight.	Number of rations.
		Pounds.	
Pork	30	6,000	8,000
Hard bread	160	8,000	8,000
Beans	4	892	5,946
Rice	1	280	2,800
Roasted and ground coffee	4	640	8,000
Brown sugar	5	1,350	9,000
Vinegar	(kegs) 4	*88	8,800
Adamantine candles	(boxes) 3	120	9,600
Soap	(boxes) 4	320	8,000
Salt	(bbl.) 1	280	7,467
Pepper	(box) 1	25	10,000
Gross weight		25,767	

*Gallons.

STOWED AS FOLLOWS.

Hard bread piled as described for car loaded with that article alone, just filling one end of car; total 160 boxes. Pork in tiers across, 8 in a tier, 3 complete tiers, and 6 barrels in another; 2 barrels of beans complete the tier. The remaining 2 barrels of beans, 1 of rice, 4 of coffee, 5 of sugar, and 1 of salt—13 barrels, and 4 kegs of vinegar, between the doors. Candles, soap, and pepper on pork.

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TABLE 3.—*Box car loaded with complete rations—Bacon.*

Articles.	Number of packages.	Net weight.	Number of rations.
		Pounds.	
Bacon	24	6,960	9,280
Hard bread	180	9,000	9,000
Beans	4	892	6,187
Rice	1	280	2,800
Roasted and ground coffee	5	800	10,000
Brown sugar	5	1,345	8,970
Vinegar	(Kegs) 4	*88	8,800
Adamantine candles	(Boxes) 3	120	9,600
Soap	(Boxes) 4	320	8,000
Salt	(Bbl.) 1	280	7,467
Pepper	(Box) 1	25	10,000
Gross weight		25,457	

*Gallons.

STOWED AS FOLLOWS.

Bacon in tiers across, 8 in a tier, 3 tiers.

Hard bread, 160 boxes in one end of car. Rice, coffee, sugar, and salt, 12 barrels in one tier next to bacon, leaving the space between doors for 20 boxes of bread, and the beans, vinegar, soap, candles, and pepper.

TABLE 4.—*Box car loaded with marching rations.*

(Three-fourths pound hard bread, ¾ pound bacon or smoked beef, full rations of sugar and coffee, half ration of salt.)

Articles.	Number of packages.	Net weight.	Number of rations.	Gross weight.
		Pounds.		*Pounds.*
Bacon	32	9,280	12,373	11,200
Hard bread	182	9,100	12,133	11,830
Roasted and ground coffee	6	960	12,000	1,140
Brown sugar	7	1,890	12,600	2,030
Salt	1	280	7,363	221
Total				26,421

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STOWED AS FOLLOWS.

Bacon in tiers across, 8 in a tier, 4 tiers. Hard bread, 160 boxes in one end of car, and 22 on bacon. Fourteen barrels coffee, sugar, and salt, on chimes between doors. It is difficult with present barrels to stow in rail cars and prevent breakage. If stowed on the bilge, the packages are crushed; if on the chimes, the heads fall in. The packages should be stronger.

TABLE 5.—*Army wagon loaded with one article.*

Dimensions (interior measurement): Length of body, bottom 10 feet; top 10 feet 6 inches; width, 3 feet 6 inches; height, 2 feet.

Articles.	Good roads.			Indifferent roads.			Bad roads.		
	Packages.	Gross weight.	Rations.	Packages.	Gross weight.	Rations.	Packages.	Gross weight.	Rations.
		Lbs.			*Lbs.*			*Lbs.*	
Pork	10	3,400	2,666	8	2,720	2,133	5	1,700	1,333
Salt beef	10	3,400	1,600	8	2,720	1,280	5	1,700	800
Bacon	8	2,800	3,093	7	2,450	2,707	5	1,750	1,933
Flour	12	2,604	2,091	12	2,604	2,091	8	1,736	1,394
Hard bread	40	2,600	2,000	40	2,600	2,000	26	1,690	1,300
Beans	12	2,880	17,840	11	2,640	16,365	7	1,680	10,406
Rice	10	3,070	28,000	8	2,456	22,400	6	1,842	16,800
Hominy	12	2,652	24,000	12	2,650	24,000	8	1,768	16,000
Roasted and ground coffee	10	1,900	20,000	10	1,900	20,000	9	1,710	18,000
Sugar	12	3,480	21,520	9	2,610	16,140	6	1,740	10,760
Candles	60	2,850	192,000	60	2,850	192,000	37	1,757	118,400
Soap	36	3,312	72,000	30	2,760	60,000	20	1,840	40,000
Salt	10	3,000	74,667	9	2,700	67,200	6	1,800	44,800
Vinegar	12	2,544	26,400	12	2,544	26,400	8	1,696	17,600
Pepper	80	2,560	800,000	80	2,560	800,000	55	1,760	550,000

STOWED AS FOLLOWS.

Barrels on the chimes. Hard bread, one tier exactly in center of body, end of box against front end board, 3 boxes high, 4 long (12), 4 boxes on edge, each side (8); on these last set on end, side of box to side of wagon, 6 on each side (12); in center, on edge, in pairs, 8 boxes binding the load; total 40 boxes. Candles on edge, end of box to end of wagon, 4 wide, 6 long (24); on these, placed on end, 4 wide, 2 long (36); total 60 boxes. Soap, 6 flat in center, 6 on edge each side, 2 high; total 36 boxes. Pepper on end, 4 wide, 10 long, 2 high; total 80 boxes.

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TABLE 6.—*Army wagon loaded with complete rations—Pork, etc.*

(Present packages unbroken.)

Articles.	Number of packages.	Net weight.	Number of rations.
		Lbs.	
Pork	3	600	800
Hard bread	16	800	800
Beans	1	223	1,487
Roasted and ground coffee	1	160	2,000
Brown sugar	1	269	1,793
Vinegar	(Keg) 1	*22	2,200
Adamantine candles	(Box) 1	40	3,200
Soap	(Box) 1	80	2,000
Salt	(Sack) 1	30	800
Pepper	(Box) 1	25	10,000
Gross weight		3,194	

*Gallons.

STOWED AS FOLLOWS.

Hard bread, 3 boxes one above the other, in center of body, ends against front-end board, 2 on each side, on their edge, both on floor, end to end; on these latter set on end, 3 on each side, side of box to side of wagon, 2 on edge side by side, on the three first laid in, binding front tier. The barrel of sugar in the center space pushed close to the three boxes laid flat, and between those on the sides; a barrel of beans behind this, then 3 barrels of pork, and 1 barrel of coffee, packed close. In rear in the center 1 keg of vinegar, with box of soap on one side, and candles and pepper on the other. The remaining box of bread on sugar barrel. Sack of salt on pork.

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TABLE 7.—*Army wagon loaded with complete rations—Bacon, etc.*

(Present packages—small stores in sacks.)

Articles.	Number of packages.	Net weight.	Number of rations.
		Lbs.	
Bacon	3	870	1,160
Hard bread	23	1,150	1,150
Beans in sacks	2	172½	1,150
Roasted and ground coffee in sacks	2	92	1,150
Sugar in sacks	2	172½	1,150
Vinegar in kegs	1	*10	1,000
Candles		14⅜	1,150
Soap†		46	1,150
Salt in sacks	1	43	1,150
Pepper		2$\frac{874}{1000}$	1,150
Gross weight		3,188	

*Gallons. †Candles, soap, and pepper in soap box.

STOWED AS FOLLOWS.

Hard bread, tier boxes in center, 2 long, 3 high, 2 on each side on edge, 3 on these on end, 4 in center on edge; total 20. Two barrels bacon behind the bread on one side, and the other on opposite side as far forward as it will go. There will be a space between the bacon and the bread sufficiently large to hold the soap box, in which is the soap, candles, and pepper; and the beans, coffee, sugar, and salt in sacks; salt put in first, then beans, sugar, and coffee; 3 boxes of bread on the bacon, vinegar keg in space between last barrel of bacon and side of wagon near tailboard.

TABLE 8.—*Army wagon loaded with marching rations.*

(Three-fourths pound of bread and meat; hard bread in boxes, bacon in barrels; sugar, coffee, and salt in sacks.)

Articles.	Number of packages.	Net weight.	Number of rations.	Gross weight.
		Pounds.		*Pounds.*
Bacon	4	1,160	1,547	1,400
Hard bread	23	1,150	1,533	1,495
Roasted and ground coffee	(Sacks) 2	120	1,500	124
Brown sugar	(Sacks) 2	225	1,500	229
Half ration salt	(Sacks) 1	28	750	30
Total				3,278

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STOWED AS FOLLOWS.

Hard bread, 20 boxes, stowed as described, for "complete rations." Bacon, 1 barrel close to bread, another on opposite side, as far forward as possible; in the space between bread and bacon, coffee, sugar, and salt; the two remaining barrels will just go inside the tailboard, with space on one side for a box of bread. Two boxes of bread on the bacon.

TABLE 9.—*Cubic space required for storage of 1,000 rations of each article, in present packages, piled in tiers.*

Articles.	Cubic feet.
Pork	28.409+
Bacon	27.588+
Salt beef	46.677+
Hard bread	61.979+
Flour	38.144+
Beans	4.522+
Rice	2.948+
Hominy	3.386+
Roasted and ground coffee	4.128+
Chests of tea	0.855+
Half chests of tea	0.808+
Sugar	3.675+
Vinegar	2.576+
Adamantine candles	0.4+
Soap	0.946+
Pepper	0.095+
Salt	

NUMBER OF DAYS' SUPPLY FOR 1,000 MEN CARRIED BY AN ARMY WAGON.

Complete rations.—All pork and complete packages, $\frac{1}{2}$ of a day.
Complete rations.—Bacon and small parts in sacks, $1\frac{1}{10}$ days.
Marching ration.—Small parts in sacks, $1\frac{1}{2}$ days.

NUMBER OF WAGONS REQUIRED TO CARRY 10 DAYS' RATIONS FOR 10,000 MEN.

Complete rations.—Pork and complete packages, 125 wagons.
Complete rations.—Bacon, small rations in sacks, 91 wagons.
Marching ration.—67 wagons.

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TABLE 10.—*Gross weight of 1,000 rations of each article of the ration in present packages.*

Articles.	Gross weight.
	Pounds.
Pork	1,275
Salt beef	2,125
Bacon	905.172
Hard bread	1,300
Flour	1,245.551
Beans	161.435
Rice	109.642
Hominy	110.5
Roasted and ground coffee	95
Tea	19.288
Sugar	161.70
Vinegar	96.363
Candles	14.843
Soap	46
Salt	40 +
Pepper	3.2

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TABLE A.—*Daily record of receipts and issues at Subsistence Depot, City Point, Va., by Capt. ——— ———, C. S. V.*

1865.	From whom received and to whom issued.	Pork.	Ham.	Flour.	Beans.	Tea.	Soap.	Salt.	
		Bbls.	*Lbs.*	*Bbls.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	
July 1	Received from Capt. ——— ———, C. S. V	200		100	50,000	5,000	8,000		Barge *Sunshine.*
1	Received from Lieut. ——— ———, A. C. S		10,000	200		1,000		28,000	Barge *Burnside.*
1	Received from Capt. ——— ———, C. S. V	500		300	20,000				Barge *Murray.*
	Total received	700	10,000	600	70,000	6,000	8,000	28,000	
1	Issued to Capt. ——— ———, C. S. V	100	2,000	50	5,000	90			
1	Issued to Lieut. ——— ———, A. C. S	50			2,000	50		2,000	
1	Issued to Lieut. ——— ———, A. C. S	40	1,000	10	1,000		500		
1	Issued to Lieut. ——— ———, A. C. S	10	2,000	60	5,000	40	600		
	Total issued	200	5,000	120	13,000	180	1,100	2,000	
	On hand	500	5,000	480	57,000	5,820	6,900	26,000	

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TABLE B.—*Report of stores on hand, afloat and ashore, at Subsistence Depot, City Point, Va., July 20, 1865.*

Stores afloat and ashore.			Due on requisitions.		Arrived and discharged.	
Quantities.	Articles.	Rations.	Quantities.	Articles.	Name of vessel.	Cargo.
800 barrels	Pork	213,333	200 barrels	Salt beef		Discharged.
20,000 pounds	Bacon	24,000	100 barrels	Corn meal	Barge *Baxter*	100 barrels flour.
120 barrels	Flour	20,907	10,000 pounds	Rice		50 barrels beans.
10,000 pounds	Beans	66,666	1,000 gallons	Vinegar		20 barrels sugar.
8,000 pounds	Coffee	100,000	4,000 pounds	Candles		100 barrels whisky.
10,000 pounds	Sugar	66,666				

——— ———,
Captain and Commissary of Subsistence of Volunteers.

LIEUT. COL. ——— ———,
Chief Commissary of Subsistence, Department of Virginia, Richmond, Va.

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TABLE C.—*Report of fresh vegetables received and issued at City Point, Va., during the five days ending July 15, 1865, by Capt. ——— ———, C. S. V.*

Date.	From whom received and to whom issued.	Potatoes.	Onions.	Turnips.
1865.		*Pounds.*	*Pounds.*	*Pounds.*
July 10	On hand per last report	16,500	12,000	5,200
12	Received from Capt. ——— ———, C. S. V.	10,000	1,000	2,000
	Total	26,500	13,000	7,200
	Issued to Capt. ——— ———, C. S. V.	5,000	3,000	1,200
	Issued to Capt. ——— ———, C. S. V.	8,000	5,000	2,000
	Total issued	13,000	8,000	3,200
	On hand	13,500	5,000	4,000

———— ————,
Captain and Commissary of Subsistence of Volunteers.

TO CHIEF COMMISSARY OF SUBSISTENCE,
DEPARTMENT OF VIRGINIA,
Richmond, Va.

TABLE D.—*Report of hides, horns, tallow, oil, etc., received, accrued, and transferred during the week ending July 7, 1865, by Capt. ——— ———, C. S. V.*

	From whom received and to whom transferred.	Slaughtered.		Hides.	Pelts.	Horns.	Hoofs.	Tallow.	Oil.
		Cattle.	Sheep.						
1865.						*Sets.*	*Sets.*	*Lbs.*	*Gals.*
June 30	On hand last report	150	40	300	60	300	300	1,000	40
	Received from Lieut. ——— ———, A. C. S.	-----	-----	10	2	10	10	100	-----
	Accrued	-----	-----	150	40	150	150	800	20
	Total	-----	-----	460	102	460	460	1,900	60
July 6	Transferred to Capt. ——— ———, C. S. V.	-----	-----	300	80	300	-----	1,500	40
	Total transferred	-----	-----	300	80	300	-----	1,500	40
	On hand	-----	-----	160	22	160	460	400	20

———— ————,
Captain and Commissary of Subsistence of Volunteers.

TO CHIEF COMMISSARY OF SUBSISTENCE,
DEPARTMENT OF VIRGINIA,
Richmond, Va.

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TABLE E.—*Abstract of provisions issued to sick and authorized attendants in hospital at ——, under charge of ——, in the month of ——, by ——.*

Date.	Number of men.	Number of women.	Number of rations due hospital.	Number of requisition.	Date of requisition.	Fresh beef.	Beans.	Candles.	Soap.	Vinegar.	White sugar.	Statement of the hospital fund.
1865.						*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Gals.*	*Lbs.*	
July 1	500	20	520	1	July 1	400	100	10	20	2	50	
July 2	510	20	530	2	July 4	300	------	40	80	------	------	
July 3	450	30	480	------	------	------	------	------	------	------	------	
July 4	470	20	490	------	------	------	------	------	------	------	------	
July 5	------	------	------	------	------	------	------	------	------	------	------	
July 6	------	------	------	------	------	------	------	------	------	------	------	
July 7	------	------	------	------	------	------	------	------	------	------	------	
Total quantity	------	------	2,020	------	------	700	100	50	100	2	50	

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TABLE F.—*Extract from morning report U. S. General Hospital, Point of Rocks, Va., July 10, 1865.*

Number of men.	Number of women.	Number of rations.
500	20	520

I certify that the above is a correct extract from the morning report.

——— ———,
Surgeon, United States Army.

TABLE G.—*Requisition for subsistence stores for the use of U. S. General Hospital, Point of Rocks, Va., July 1, 1865.*

400 pounds fresh beef.
100 pounds beans.
10 pounds candles.
20 pounds soap.
2 gallons of vinegar.
50 pounds white sugar.

I certify that the above stores are required for the sick in hospital and the attendants.

——— ———,
Surgeon, United States Army.

TABLE H.—*Abstract of "Hospital Purchases" for U. S. General Hospital at Point of Rocks, Va., during the month of July, 1865, by Captain ——— ———, C. S. V.*

Date.	Number of voucher abstract of contingencies, July.	Articles.								Amount.	
		Poultry.	Butter.	Eggs.	Lemons.					Dollars.	Cents.
1865.		*Lbs.*	*Lbs.*	*Doz.*	*Doz.*						
July 10	8	50	60	40	10	----	----	----	----	------	------
18	12	40	20	15	8	----	----	----	----	------	------
20	15	60	30	20	5	----	----	----	----	------	------
Total	------	150	110	75	23	----	----	----	----	------	------

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SUBSISTENCE OFFICE,
HARPERS FERRY, VA., *June 29, 1865.*

TO BRIG. GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

GENERAL: In accordance with circular letter, C. G. O., June 1, I have the honor to submit the following report: For the past two years and nine months I have conducted the commissary depot at this post. Grand depots should be established at the most convenient places for receiving and issuing to an army; care should always be taken to secure points protected against the enemy, also near railroad and water transportation when possible.

Storehouses should be always well ventilated and of sufficient size to protect all perishable articles; great care should be taken to guard against fire. In addition to ordinary guard, a private watchman I have found indispensable. Cattle corrals should be located on high ground near water and racks constructed from young timber, with troughs, for feeding hay and corn. Cattle should be salted often when grazing.

Bakeries.—In the establishment of depots of supplies, bakeries are necessary for the healthful subsistence of the troops. The bake houses should be located near to water of a good quality, and convenient for transportation per railroad or wagons. The ovens I have used at this post are 13 by 12 feet inside, with four flues for regulating draft and dampers for regulating the heat. The usual amount of saving to the Government by baking is from 28 to 33 per cent, according to the quality of the flour. Dry wood is used in all cases when obtainable. My experience is that it is more economical to employ citizens as bakers than detailed soldiers, for the reason that they are more skilled and more careful in weighing and preparing the bread and can be more permanently retained. The amount of saving at this post by the baking under my management has been over 10,000 barrels of flour in the past two years and a half.

Preservation of stores in the field and depots.—When buildings can not be obtained, paulins should be abundantly furnished in all cases. Dunnage can always be obtained in rails or young timber. When practicable, platforms should

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be built and paulins should be stretched above as roofing, extending well over the sides, as protection against the weather. After storms, stores should be carefully examined with a view to ventilation and being kept dry. Salt meat should be rolled over as often as once a month, to change the position of contents.

Best size of packages for molasses is 10-gallon kegs, being less liable to wastage in the field; vinegar in 20 to 25 gallon kegs. Bacon, to keep well, should be canvased and kept in a cool place; it is preferable in barrels to boxes. Rice, beans, hominy, and corn meal are the most liable of all stores to damage; next, salt meats. Large amounts of hard bread depreciate while in store, owing to imperfection of the materials from which it is made and the inefficient drying of the same after manufacture before boxing, being liable to heat and mold.

Beef cattle, when practicable, should be slaughtered at night to allow for the escape of the animal heat as a sanitary measure. The detailed butchers with brigades should be instructed to avoid cutting the hides, as it materially injures them for the market. As a rule, it is best to remove the horns from the hide, as vermin harbor in them. Large savings can be made of tallow, except on marches, by having the butchers render it out in camp kettles or otherwise and then place it in empty pork barrels for shipment.

Subsisting on an enemy's country.—This can be most effectually and humanely accomplished by having an officer detailed with detachments of mounted men as foragers, with instructions, when the supply is sufficient in the surrounding country, to subsidize as equally as possible upon the inhabitants according to their individual possession when circumstances and time will permit. Chickens and garden vegetables may be taken at all times and in all quantities for the hospital department exclusively, officers to give certified accounts to be paid on proof of loyalty. Desiccated potatoes and mixed vegetables are not liked by the troops owing to the difficulty of cooking to all other vegetables. Troops prefer potatoes, onions, and cabbage; sauerkraut being very liable to spoil in

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warm weather, troops do not ask for it. In sieges, ascertain total strength of command. Consult with commanding officer and issue in accordance with supply on hand. When water and forage can be obtained, drive in cattle, sheep, and hogs from surrounding country. Stations likely to be besieged keep large supplies of salt, hard bread, coffee, sugar, vinegar, candles, and whisky. Simplest marching rations are hard bread, coffee, sugar, salt, and beef cattle on the hoof. The most effective means for the destruction of stores consists in pouring vinegar on coffee and sugar and whisky on all other stores before firing the same. Capacity of railway cars varies according to size of cars; about 7,000 complete rations can be carried on each car. Nature of reports made to superiors: Amount of stores on hand trimonthly; list of employees and account current. The ration of vinegar, soap, and salt could be reduced, and an additional vegetable ration should be issued,

Very respectfully your obedient servant,

GEORGE S. LELAND,

Captain and Commissary of Subsistence of Volunteers.

SUBSISTENCE DEPARTMENT, UNITED STATES ARMY,
NO. 936 WEST LEXINGTON STREET,
BALTIMORE, MD.

BRIG. GEN. A. B. EATON,

Commissary General of Subsistence, Washington, D. C.

SIR: In reply to your circular letter of June 1, 1865, I have the honor to make the following statement:

Since my connection with the Subsistence Department I have been exclusively in charge of beef cattle, and therefore must necessarily confine myself in my observations to the best method (as proved by over three years' experience) of selecting, driving, herding, feeding, watering, and slaughtering cattle, and preservation of hides, tallow, etc., leaving all other questions embraced in your circular to commissaries of greater experience in such matters.

Beef cattle.—All large armies in marching great distances from their base of supplies, and when there is no opportunity

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for foraging upon the enemy or when the supply of the country would be inadequate, must depend upon beef cattle for the greater portion of the meat ration. From the superior facility of transportation a herd of 5,000 head can be driven from 12 to 20 miles per day, and if the pasturage is good will deteriorate but little, furnishing over 2,000,000 rations of meat while the same number of rations of salt pork will require about 100 wagons. Wherever troops can move, cattle can be driven without interfering with roads required for artillery and wagons necessary to carry supplies.

Selection of beef cattle.—Beef cattle for army use should be fleshy and not too fat, being easier to drive, and not losing weight to the same extent as fat cattle either transported by rail, boat, or driven on the road; besides, the beef is more economical for boiling, the usual method of cooking for troops. Soldiers almost invariably reject the fat of beef.

Age.—The age should be from four to seven years. A steer does not arrive at maturity until it is four years old and has more nutriment in its beef than one of less age, and over seven the beef becomes coarser and tougher. Between the two ages they will suffer less in transportation by railroad or boat and lose less flesh than at any other age.

Weight.—The weight should be between 1,100 and 1,400 pounds gross. Cattle of less than the former or greater than the latter will deteriorate in transportation in proportion to weight to a greater extent than those between the two weights specified, those under 1,100 not having sufficient strength, and over 1,400 on account of excessive weight.

Herding.—In herding, where there are no fences for corrals, the cattle should be allowed a free range of country with mounted herders at equal intervals and within sight of each other on the outer circle.

Driving.—When possible, cattle should be started on the road at daybreak, and after one hour the herd should be stopped to rest and ruminate, when they will be found to drive with more ease to themselves than if the stoppage had not been made.

At meridian, if opportunity offers, the herd should be halted from one to two hours, allowing them to feed and water.

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Cattle should never be driven, but permitted to assume their own gait, except the lively fast-traveling ones that require to be held in check to give those in rear an opportunity to close up and prevent separation.

A herd should never be separated in sections, especially in proceeding through a wooded country. The number of men required in the field is about three to the 100 head. They should be placed at equal distances on the sides, with a strong force of herders in the rear to guard against straggling, for there will be in all large herds some that are lame or too heavy to travel well.

Feeding.—The proper feeding of beef cattle is a matter that has never been thoroughly understood in the army.

Hard bread should never be fed to cattle. Flour, no matter how prepared, is injurious; being sweet to the taste, they eat of it greedily (creating intense thirst), and if permitted will fill themselves with water. The gastric juice of the stomach causes fermentation; the steer can not chew the cud or pass it from the stomach, and inflammation invariably ensues, creating the worst description of scours, terminating in almost every instance fatally.

The worst phase of feeding hard bread is that the largest and finest cattle, being stronger, drive the sick and weaker away, and are consequently the victims.

Pasturage.—In pasturing, water should be of convenient access from the feeding grounds, and cattle should not be kept on the pasture more than eight hours in twenty-four, commencing at daylight in the morning, removed at the expiration of four hours and replaced at say 2 o'clock p. m. and removed at 6 o'clock p. m. This method gives them an opportunity to chew the cud and prevent unnecessary trampling of the grass.

Forage.—When forage is required, good timothy hay, or clover and timothy hay (mixed) and corn in the ear, is best for cattle, fed in proportion of about 20 pounds of each. Hay should be fed in the morning and corn in the evening, on account of the great amount of heat contained in the latter.

Watering.—Water should be, if possible, embraced within the limits of the feeding grounds, that cattle may drink

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whenever they desire. When such is not the case they should be driven to water after the morning and evening feed.

Salting.—To prevent scouring in cattle while on pasture, salt should be given at least twice a week with about 4 ounces per head each issue, and when on hard feed, to give them an appetite, about 4 ounces per head per week in two issues.

Winter quarters.—The preceding statements are made entirely with a view to supply beef cattle on a march or campaign, but when in winter quarters a different method of issuing fresh beef to troops is necessary both on the score of economy and convenience.

Location.—When an army is in winter quarters the army herd should be located as nearly in the center as possible, convenient to the line of transportation, and a slaughterhouse established whence beef should be supplied to the different depots for issue to the brigades.

Sheds should be provided for salting hides and pans provided for rendering tallow.

By this method it will be found that the saving to the Government in the superior manner of preserving hides and tallow will produce a revenue more than sufficient to pay for feeding, herding, and slaughtering the cattle, salting the hides, and rendering the tallow.

Slaughtering.—In summer, cattle should be slaughtered in the evening, and hung in the most convenient places for draft of air, and issued to the troops early in the morning; by this method all the blood heat will have departed, and many cases of diarrhea prevented among the troops, caused in a majority of instances by the cooking of fresh beef just slaughtered and the blood heat remaining therein. Cattle should never be slaughtered in the open field when it is possible to obtain a barn or shed where they can be hung up and thoroughly cleansed.

When in winter quarters, slaughterhouses should be provided where water is plenty and with all the necessary appliances of a first-class slaughterhouse. The beef should hang at least twenty-four hours before issuing to allow moisture to evaporate. Particular care should be exercised to remove the hides free from cuts and scores that they may bring the highest market price when sold.

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Salting Hides.—In preparing hides for salting, the horns, tail, skull, and sticking piece should be removed, also the nose split. The hides should be laid hair side down in stacks about 10 feet square and about 2 feet high, salt scattered loosely on the flesh side, and the flank pieces on side and ends turned up to retain the liquid salt until absorbed by the hide. Nothing but Turks Island rock salt should be used, for all other kinds dissolve too quickly, while Turks Island will dissolve only as fast as the hides are capable of absorbing, and when mixed with fresh salt can be used the second and even the third time until every particle is used. The hides should be kept in stacks about one week, then taken up, all loose particles of salt shook off, folded in the center until the flanks lap, doubled and then folded lengthwise about 16 inches wide.

Another method of preserving hides may be adopted when the preceding manner is not convenient, viz: Trimmed as before stated and salt (liquid alum is best in this case) loosely sprinkled over the flesh side and then hung in the middle over a fence or pole, flesh side out, exposed to the sun.

If allowed to remain two or three days, they will be found to produce a very fair quality of dry hides.

Rendering Tallow.—Where tallow is to be rendered, large shallow pans should be used, and a steady heat kept up just at boiling point; it should be constantly watched and stirred, and as the dirt and refuse matter ascend to the top they should be skimmed off. When all the refuse has been removed, a few hours' boiling will harden the tallow, when the fires should be removed and the tallow allowed to cool gradually.

Offal.—The liver, heart, tongue, horns, feet, tails, flank pieces, bones, etc., can be disposed of advantageously to the Government, so that no portion of the offal need be wasted.

The foregoing remarks as to the proper management of beef cattle is the result of over three years' experience in the field and close attention to the subject.

With a sincere hope that something herein contained may assist to demonstrate the problem "How to feed an army,"

Very respectfully, your obedient servant,

W. R. MURPHY,

Captain and Commissary of Subsistence of Volunteers.

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OFFICE OF COMMISSARY OF SUBSISTENCE,
NEW YORK, *June 22, 1865.*

SIR: Agreeably to instructions contained in circular letter dated Office Commissary General of Subsistence, Washington, D. C., June 1, 1865, I have the honor very respectfully to submit the following observations, numbered to correspond with the circular letter:

5. I am of opinion that for the preservation of stores in depots the buildings should be so arranged as to secure the best possible ventilation; cured meats and antiscorbutics should be invariably stored in dry, cool cellars, the other component parts of the ration so arranged in dry, airy rooms that they can be easily removed without disturbing the bulk more than is absolutely necessary, and discretionary power given to the officer in charge to make such disposition of any stores as upon proper examination shall be found deteriorated in quality as may appear to him best for the interest of the service.

7. The marching ration of the soldier should consist of coffee, sugar, salt, flour, or hard bread, and beef on the hoof, and in liberal quantities.

11. Correspondence should be invited in the ascending and descending scale upon all subjects pertinent to the supplying of an army, the resources of the country, the facilities of transportation, and authority vested in superiors to decide all points which may arise in the practical working of the duties of the department, and a copy of every decision rendered should be sent to the officer next higher in authority.

19. Commissaries should be allowed to purchase with the hospital fund all articles required for the use of the sick, upon requisition of the surgeon in charge.

Very respectfully, your obedient servant,

DANL. S. HART,
Captain and Commissary of Subsistence of Volunteers.

GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

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OFFICE COMMISSARY OF SUBSISTENCE,
TRENTON, N. J., *August 1, 1865.*

GENERAL:

In answer to a circular letter received from your office, dated June 1, 1865, I have the honor to transmit herewith inclosed a report embodying the results of my experience in matters concerning army subsistence.

I am, General, very respectfully, your obedient servant,

F. C. FORD,
Captain and Commissary of Subsistence of Volunteers.

BRIG. GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

OFFICE COMMISSARY OF SUBSISTENCE,
TRENTON, N. J., *July 25, 1865.*

GENERAL:

I have the honor to submit the following report in answer to your circular letter of June 1, calling upon me for the results of my experience in matters relating to the subsistence of an army.

The duties of an army or corps commissary, like those of division, brigade, or regimental commissaries, are to see that all troops with or in his particular command are properly supplied with good and wholesome food; these duties for an army are, of course, on a more extended scale than for a regiment, but in general principles, forms, manner of procuring and issuing stores, in nearly all cases, the same rules will apply to the one as to the other.

An army commissary should draw his supplies from the nearest purchasing commissary, or one from whom they can be received with the greatest facility; he should make his requisitions for the entire command, and for a length of time that should be determined upon in accordance with the distance they have to come and the probable facilities for transportation, for although the strict question of transportation relates only to the Quartermaster's Department, and the Commissary Department is not responsible for a lack of transportation, still a timely requisition may prevent much suffering

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for want of food, where shipwrecks or other accidents entirely beyond the control of quartermasters might have occurred. It is advisable for an army commissary always to keep on hand a few more stores than he actually needs, and to exercise an extra amount of care and attention in preserving them rather than to run out of the least important item for no matter how short a time. The ration when properly packed and well cared for may be preserved in almost any climate within the boundaries of our country, and if it could not, it were better to lose a few rations than for lack of them a few men.

The requisitions of an army commissary should always be approved by the commanding officer of the army; he should know accurately the number of troops in the command and their different posts or stations. If the command is an extended one, there being many detached posts, he should at once ascertain the different methods of access to them, the probability of continuous or interrupted transportation, and endeavor to keep each post supplied in such a manner as to guard against any contingency arising from a lack of transportation. He should know the amount of stores on hand at any time and the amount of stores due on any requisition. In order to facilitate his work he should call upon all subordinate officers, particularly upon those having charge of stores in bulk, to make frequent reports (trimonthly are usually sufficient) showing the amount of stores on hand at each depot or post suitable for issue or for sale to officers. Should any stores at the different posts become damaged or unfit for issue, he should require that they be immediately reported to him, in order that he may make the necessary arrangements for replacing them. In an extended command he should make, or if his duties will not permit of his attending to it personally, he should have at least one practical commissary to act as an inspector, who should make frequent inspections of the stores at every post, examining the stores, their condition, quantity, quality, and, above all, the manner of caring for and protecting them.

The army commissary should also have a general supervision of all accounts and returns of his subordinates, and in

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this matter the inspector could be of great service; he should be authorized to examine the books and accounts of the different commissaries, and should suggest or make such corrections as may be found necessary. It would also facilitate the business of the different officers, and at the same time relieve the office of the Commissary General of Subsistence of a large amount of annoying and unnecessary work if the army commissary should require that all returns and accounts intended for the office of the Commissary General from his subordinates be forwarded when completed to his office for examination; he could have them carefully examined, and if found correct, forward them to Washington, and if not correct, return them at once to the officer making them, with such corrections, explanations, or remarks as he should choose to make. By adopting this course much time and annoyance has been saved in some of our Departments to many officers.

The duties of a division commissary depend somewhat upon the formation of his division; should the regiments be together, there is no necessity for brigade commissaries; the division commissary may draw his stores in bulk from the nearest depot commissary and issue to the regiment or detachments of his division upon consolidated returns, signed by the proper subordinate commanders and ordered by the division commander. By adopting this plan regimental commissaries are relieved from the necessity of making returns and brigade commissaries may be assigned to other and more important positions where their services may be needed. If the division is permanently located the commissary can easily erect temporary storehouses or shelter for stores sufficient to subsist his men for thirty days or longer, if considered advisable by his commanding officer; if not, he should keep his train loaded, if possible, with not less than five days' supplies, in order to be ready to move with them at any time. Where the division is separated and at different points and it is not convenient for the different brigades to draw from their division commissary, brigade commissaries should issue upon consolidated returns in the manner prescribed for division commissaries, the issue being ordered by the brigade commander, but there is no necessity for regimental commissaries

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to receive stores in bulk except when at isolated posts, where it is impracticable for them to draw from brigade or division commissaries.

The more stores are handled from the time they leave the depot until their final distribution to the different companies of the regiment for which they were drawn, the greater is the damage and wastage, and when possible for the division commissary to draw in bulk and issue at once on the proper returns the damage is slight, and the wastage, if any, is easily accounted for by the one officer, but if he again transfers to a brigade commissary who in his turn transfers to a regimental commissary, the same wastage occurs in the second and third transfer, and subsequent issues as would occur in the first, while the proportion would be greatly reduced if but one officer had the entire charge of the issue.

Where a command is permanently located, and consists of more than a division, a post commissary should be appointed whose duty it should be to issue to the entire command on consolidated returns properly signed and ordered by the post commandant. In this case his duties would be arduous, but by adopting a systematic method of conducting them they could be facilitated to such an extent that his issues might be made to several divisions about as easily as to a brigade. He should draw his stores in bulk from the nearest depot. It would be necessary for him to have a storehouse and his requisitions upon the depot should be for one month at a time. Hours for issuing to troops daily might be designated, as well as hours for sale of stores to officers; this would give the commissary time to examine and arrange his papers and accounts and could be adhered to without inconvenience or delay to anyone, unless in exceptional cases, the sudden movement of some portion of the command where extra rations were required, for instance, when of course the commanding officer could order the commissary to issue.

The force of the post commissary should consist of at least two office clerks, two issuing clerks, eight laborers, and, if he has charge of fresh beef, one butcher. With these assistants 10,000 men can easily be issued to during the month. When practicable, the returns should be handed to the commissary

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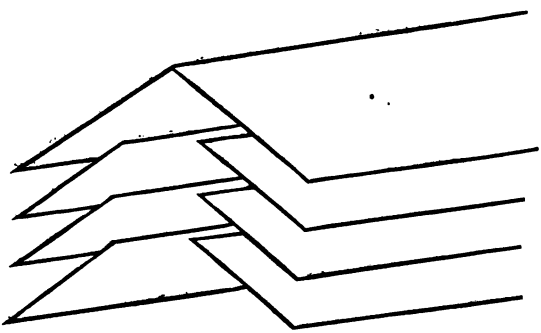
the day before the stores are required, in order that the rations may be bulked, and thus avoid delay, confusion, and possibly mistake on the issuing day.

Grand depots for supplying large departments should be located where they can both receive and issue with the greatest facility; that is, if stores are received and issued by water transportation, the storehouses should be located as near as practicable to the docks or landings. If buildings are to be erected, a level plain should be selected, but in a perfectly dry situation. In most places all necessary water can be obtained from wells, while the damp atmosphere of a swamp or marsh will very soon damage many of the stores.

Free ventilation is absolutely necessary to keep stores in good condition. To accomplish this, the buildings should always be raised from 3 to 4 feet from the ground; this will keep them clear of any dampness emanating from the soil and allow a free circulation of air under the stores.



They should be ventilated also, and one of the best, and I think the cheapest, ventilators I have seen is made in the form of two ordinary blinds placed back to back, and a space of from 4 to 6 inches between, with the slats so arranged as to turn the water. This is placed at the top or peak of the roof, which is left open to correspond with the size of the ventilator, the opening being completely covered and protected by the ventilator itself. Four or five slats on each side are

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generally sufficient, the two upper ones, of course, meeting in the center. They should be near enough together, and extend far enough toward the center to prevent the water from blowing in through them. This ventilator should run the entire length of the building and will answer its purpose perfectly.

Storehouses should always be lighted by windows placed in the roof, as it is often necessary to pile or tier barrels and packages at the sides, and the windows if at the sides are often completely obstructed.

In regard to the size of storehouses, I have found that a building 40 feet wide and about 14 high is the most convenient for all stores except wet meats. The length may be determined by the amount and nature of the building ground, but is not as important as height and width; I have had them 27 feet wide, but found that the other width was far preferable. Large doors should be placed at each end of the house, and in a house 300 feet in length two doors on each side are sufficient.

In regard to the number of clerks and laborers required at a general depot no rule can be given; it must depend, in my opinion, entirely upon the officer in charge. At a depot where there may be six or eight storehouses, it may be necessary to issue from every house at one time, or to receive stores at some of them and issue from others at the same time; it requires accurate and reliable clerks to do this, and at depots where this is necessary the office clerks will have all they can attend to at their desks. The outside or storehouse clerks should be selected by the commissary as he requires them. I have always required that a clerk or storehouse man should sleep in each storehouse, usually the one of which they had particular charge, for by giving each storehouse man one or more storehouses to take particular charge of he is better enabled to know the particular arrangement of the stores, which have been on hand longest and the condition of them, than if all are allowed indiscriminate charge of each, and the responsibility for any negligence in their care or for errors in receiving or issuing is easily fixed

Requisitions upon the depot commissary should pass through the office clerks. If the requisition is in pounds the office clerk

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estimates the number of packages required (as it is not expected that a depot commissary will break packages), and sends an order to the storehouse clerks; for meats, to the storehouse man in charge of the meat house, and for other stores in the same way. After the stores have been issued, these orders should be returned at once to the office, with the weights and packages of each article issued; these are compared with the requisition and the invoices made from them.

A stock book should be kept by every depot commissary, of which one office clerk should have the entire control. In it is entered all stores received, with the packages and weight, and on the other side everything issued is entered. By means of this book, carefully kept, a commissary can tell in a few moments at any time the exact amount of stores he has on hand, no matter what the extent of his business may be. This book will enable him to report at any time to the chief or army commissary the amount of stores on hand without the delay of taking an account from his storehouses, as, if properly kept, it will give an accurate account of stores actually on hand. This should be verified whenever any one or more articles are so reduced as to allow an accurate account to be taken, and at the end of each month the balances of the stock book should agree with the "Balance to be accounted for," as reported on the commissary's monthly return of provisions. A very little attention to this book will save much annoyance and will serve also as a check upon all issues, and to correct omissions in invoicing.

In regard to the movement of stores by railroads, as I have had no experience in the matter, and can not speak of the subject from my own knowledge, I therefore prefer leaving that portion of the report to some other officer who is better able to report upon it than I. In shipping stores by sea, I have always preferred steam transportation for all stores unless wet meats, which are not apt to become damaged by a protracted voyage or the moisture usually found in a ship's hold. Dry stores should remain on board vessels as short a time as possible.

In stowing and loading a cargo of subsistence stores, care should be taken to place all of the heaviest packages at the

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bottom or ground tier. These, in most cases, will be the meats, such as bacon, hams, etc., and if wet meats are included (pork and salt beef), they should also be placed at the bottom, care being taken that they are properly dunnaged, in order that the weight of the succeeding tiers may not press unevenly upon them and start the hoops and staves, causing the brine to leak out. Vinegar, molasses, whisky, and pickles should follow these, care being taken that the bungs are properly secured, and placed up to prevent leaking. I hold that these articles should all be placed under the dry stores, as a leak from any one of them, if allowed to run down upon dry stores would soon damage them beyond redemption. The other stores all require a dry position, one quite as much as another, so that weight and size are about the only remaining points to determine their place, the smallest and lightest packages to be placed on top. Salt beef and pork may be carried on deck very well, if covered from the sun and the barrels frequently wet; this prevents the outer edges of the staves from shrinking, and the seams from opening.

Beef cattle suffer from long sea voyages and on that account steamers are preferable if the cattle can be carried on deck, but very few steamers are arranged in such a manner as to admit of this, and unless steamers are built and arranged expressly for carrying cattle they should never be placed below decks. Cattle come out from the hold or "between decks" of a steamer alive, perhaps, but in such a sick, weak, and diseased condition that they are unfit for anything, particularly wholesome food; the lungs are almost always diseased, evidently from a lack of fresh air, and cattle thus transported will seldom regain their flesh, but continually waste and lose in weight and finally die, and if killed by the butcher, although the eligible parts of the beef may appear to be good, it is usually feverish and I do not think is healthy as food. So far as my experience goes, it is in favor of shipping cattle by small sailing vessels and on deck only. I have seldom had an ox die from disease when shipped in this manner; they occasionally met with a storm, when the cattle would be thrown down, sometimes killing or necessitating the killing of

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two or three, but the remainder would arrive in a good and healthy condition.

One all-important item in shipping cattle is that they be abundantly supplied with water. The cattle pay freight while the water tanks do not, and the masters of vessels will often reduce the number of water casks to make room for a few more cattle. This should never be allowed, as cattle suffer more and lose more flesh from a lack of water than from a lack of hay; they may be placed on short rations of hay, but never on short rations of water. Another item of no small importance is the selection of herdsmen, particularly those in charge of cattle on board ships. Cattle intended for beef should be kept quiet and excited as little as possible; a sea voyage will naturally tend to make them feverish, and with ignorant and brutal herdsmen in charge this is sometimes increased to such an extent that the cattle are almost worthless. They sometimes beat them with sticks or shovels until the cattle are covered with sores, and I have kept them for months before I thought them sufficiently recovered to be fit for issue.

Cattle should never be driven far immediately after landing, as they require some little time to rest after a long sea voyage. If a corral is made, it should be located within a mile of the usual landing. I have found an inclosure of about 15 acres sufficient for 1,200 head.

In selecting a location for a corral, a small grove of shade trees should be inclosed, if possible, as cattle are not fond of too much sun. A shade should be afforded them, if possible, and if a small stream of running water can be inclosed or led through the corral it seems to keep them in health. If a brook runs through it, care should be taken to fence out all soft and muddy portions, as cattle would otherwise become mired and cause great trouble, if they did not die in it.

To guard against drought it is not safe to depend entirely upon the stream for water. Wells should be sunk at once; four wells are amply sufficient, and long troughs should be made, raised about 3 feet from the ground to prevent the cattle from trampling them under foot. These should be made of sufficient length to accommodate a large number of oxen

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at a time, and kept constantly full; this will prevent the rushing and crowding of the cattle, when they are apt to injure each other and to break down the troughs.

Racks should be made for hay, with a trough at the bottom for corn, the whole to be raised about 3 feet from the ground, otherwise the hay and corn will be wasted and trampled upon. These racks should be placed in two lines facing outward, with space enough between to allow a cart to be driven through to distribute the hay and corn.

It is well to have a small corral or pen, say about one acre in extent, into which two or three days' supply of cattle may be driven and kept away from the large herd a few days before killing. They become more quiet, do not heat themselves by running and fighting with the others, are easier managed, and in better condition generally, than if killed immediately upon being taken from the herd. This small corral should be near the slaughterhouse, with a lane leading direct to it. The slaughterhouse should be raised well from the ground; 5 or 6 feet is not too high, as this will allow the ground under it to be thoroughly cleansed of any dirt or blood that may accidentally collect there, for none should be allowed to fall under the house that can be prevented.

Too much care can not be exercised in keeping the slaughterhouse and grounds perfectly clean; the floor should be double and heavy, the upper one "breaking joints," and if possible tongued and grooved; this will prevent anything from running through between the boards. The floor should be inclined at an angle to readily carry off the blood to one side of the building, where it should be conducted by troughs into tubs or barrels placed to receive it. A well and pump should be placed near, so that water can be led directly into the slaughterhouse, and care should be taken that the floor is thoroughly washed and scrubbed after every killing. The offal, blood, etc., should be carried off and buried every day; the entrails should be carefully scraped of the tallow by the butcher, a large amount being saved in this way. The tallow should be tried or rendered by melting over a slow fire, care being taken not to burn it; large iron pans or kettles holding about 25 gallons are the best for this purpose, and should, if

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possible, be set upon a brick fireplace; when thoroughly melted it should be poured into barrels (empty pork or whisky barrels are the best) and allowed to cool, when they may be headed up, the tare and gross weight marked upon them, and kept for sale or disposed of in accordance with orders.

A large saving accrues to the Department from the sale of hides and tallow, and particular attention should be given to it. A good butcher will save double the amount of tallow that a poor one will. In taking off the hides he should be cautioned not to cut them, as every knife cut reduces the value of the hides. It is customary in buying and selling hides to deduct 25 cents from the value of the hide for every cut, so that a poor butcher would soon cut up his own salary if charged to him at that rate.

Hides in hot climates in summer may be sufficiently cured for transportation by exposing them to the action of the sun, which soon dries them, but in winter they should be salted. A good way to do this, when there are many hides or if liable to remain on hand any time, is to have a tank made about the size of the hide, spread one on the bottom, the hair side down, and cover well with salt, place the next with the flesh side down upon the salt, the third one flesh side up and cover with salt, and so on until the tank is full; this should then be covered to prevent the flies from getting at them, and the moisture from the hides, together with the salt, will make a pickle that will preserve them as long as desired.

When packed for transportation they should be folded with the flesh side in, and, commencing at the neck, rolled into a compact bundle, winding the tail around the outside; they are not easily damaged in this form and can be transported any distance.

Where it is practicable, I think that the slaughtering for an army should all be done by one officer. He can have as many butchers as are necessary, and by having his slaughterhouse well arranged he can deliver the beef in better shape and condition than when slaughtered by each brigade. The hides and tallow are better cared for, and more attention paid to saving both, than if killed by detailed men and scattered all through the army.

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Cattle should be turned out to graze whenever circumstances or the nature of the country will permit, and in addition to this hay should be provided so that they can get it whenever they want it. Many persons object to feeding cattle with corn, but when given them at regular times and on the ear I have found considerable advantage from it, especially where grass or other green food can not be obtained. Shelled corn does them no good, but on the contrary is apt to affect them unfavorably.

One word in regard to the manner of unloading cattle from a vessel. Whenever practicable, cattle should be walked from the ship to the dock on planks arranged with side rails, and as this is the easiest method, ship masters are generally pretty apt to adopt it when possible; but in certain cases it becomes necessary to hoist them out by a rope and fall, and in such cases I would never allow them to be slung by the horns; this is a practice very common in South American ports, where cattle are raised for their hides only, the beef being a matter of secondary importance, and it might answer with the native cattle of some of our Southern States, but it should never be attempted with our heavy northern cattle. I speak forcibly against this practice because I have repeatedly heard masters of vessels urge the plan upon quartermasters and others when anxious to discharge their cargo. The only proper way is to use a cattle sling for the purpose, and where cattle are frequently arriving two or three of them should be kept at the depot; if none are ready in case of need, any sailor can make one in half an hour from a strip of canvas about 3 feet wide, long enough to pass under the body of the ox and the two ends to meet on his back. A strong stick should be passed through each end of the canvas, a hem having been prepared for it; eyelets are made just inside the sticks through which loops of strong rope are passed, to fasten it around the body and also to hook the fall in, and with the addition of a small cord to pass from side to side around the chest and another in the same way around the tail (both to tie, to prevent it from slipping) the sling is complete. By this method the animal is landed on his feet, and no matter how much he may kick and struggle in the air while being hoisted, he can not hurt

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himself. I have never had an ox injured when landed in this manner.

Great care should be exercised for the preservation of stores by the officer in charge of a depot. Pork and beef barrels should always be laid upon skids and never tiered one upon another unless lack of storeroom renders it absolutely necessary, and then never more than three tiers high.

It is not necessary that salt meats should be kept in dry storehouses; a rough shed, sufficient to protect them from the sun, is all that is necessary. They should be frequently rolled over and the position of the tiers changed. A constant supply of brine should be kept on hand, and the barrels carefully filled to prevent any portion of the contents becoming uncovered, as it will spoil rapidly in a hot climate unless covered with brine; the brine should always be strong enough to allow some salt to remain undissolved, and one or more wells should be placed within reach of the meat house for the purpose of making brine.

Smoked meats, such as ham, sides, and shoulders, should be kept away from the sun as much as possible: frequent inspection of them should be made, and they should be carefully repacked when damaged, or, if infested with "skippers," they can be thoroughly cleaned, the damaged parts cut off, and if then wrapped in coarse brown paper and repacked in tight barrels or casks, they will keep a long time; in repacking, the casks should be thoroughly cleansed.

For packages for beef and pork I prefer the ordinary-sized barrel of 200 pounds net: the tierce of 300 pounds is unhandy and has no advantage that I can discover over the barrel; boxes for bacon containing usually about 225 pounds are not as easily managed as barrels containing even a larger amount of meat; a box of over 50 pounds weight is clumsy, and can not be handled as rapidly nor as safely as barrels or tierces; in short, I prefer barrels for all kinds of meats.

Flour should be well ventilated, and occasionally rolled out from the storehouse, as by remaining in one position long it becomes lumpy and then sour. A barrel of flour is not necessarily spoiled by being wet, as the water will seldom penetrate to a depth of more than 1 or 2 inches from the stave. If

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allowed to remain in this condition long, or if exposed to the sun, it will soon sour, but by attending to it at once, and changing into other and dry barrels, the greater part may be saved.

Beans often become moldy from not being properly dried before barreling, or by collecting moisture from any other source; these may be saved by spreading them upon paulins and exposing them to a hot sun, shaking them up as much as possible, and they become thoroughly dried, the mold blowing off like dust. Beans are very apt to become damp, but a little care will save them; they should always be tiered with a passageway between each row of barrels in order that a portion of every barrel may be seen. Wet or moldy beans always act upon the barrels, discoloring them so that the commissary can almost invariably pick out the damaged barrels from the sound ones.

Rice is very apt to become infested with weevils, and this is a pest I can give no sure method of guarding against; it should be frequently inspected, and on the first suspicion of their being in any portion of the rice, it should be separated from the sound parts. I should place it in my meat house, where the insects could do no damage by spreading, and should change the sound rice to some other part of the house or to another storehouse. Tight barrels, like whisky barrels, are the best for rice; they should be strongly hooped, as the rice is very heavy, and if kept perfectly tight, the bungs, when there are any, being covered, it is about all that can be done to keep weevils out.

Corn meal should be aired as much as possible, and occasionally rolled, but its nature is such, that it will not permit much handling, unless, like rice, it is packed in tight barrels. I have never yet seen any in the army that was packed in sufficiently strong barrels. The meal heats of itself, the heat shrinks the staves, loosens the hoops, the meal wastes through the seams and the chances are that the barrels will fall to pieces on the first attempt to move them.

The most convenient form for hard-bread packages are the 50-pound boxes; they are easily handled and transported, and are better packed than barrels, and the bread does not become

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broken as much as when in barrels. The boxes should be made of thoroughly seasoned wood and well strapped with green hoops. In storing boxes of hard bread it may be piled to almost any desired height, but should be so arranged as to allow the air to pass freely between the boxes.

Coffee, when roasted and ground, requires great care in keeping it perfectly dry, and as nearly air-tight as possible. When exposed to the air it soon loses its strength and flavor. It is well to have the barrels lined with coarse paper before filling; these, as well as all barrels containing dry stores, should be head lined.

Tea, when in the original packages, lined with sheet lead and covered with matting, is perfectly safe and will stand any amount of transportation; the wood, however, being thin and light, care should be taken not to drive one chest through another in tiering it up.

Sugar should be kept in a dry place, and the barrels never allowed to remain in one position long, for the natural moisture of the sugar settles to the bottom and will finally run off in the form of syrup, causing great loss. This is avoided by rolling the barrels over, placing what was the underside at the top. As sugar is very heavy, the tiers should never be more than four barrels high, and not more than three unless the want of room renders it necessary.

I have found the best package for vinegar to be a large keg or half barrel, containing about 20 or 22 gallons. These are easily handled and are convenient for transportation. In tiering them skids should always be placed between them. Vinegar penetrates the wood very easily and evaporates rapidly. To prevent this as much as possible the kegs should be painted and the bungs carefully capped with tin; the bungs should always be placed at the top of the tiers, and as cool a place as practicable selected for storing them.

I prefer salt in barrels as the sacks of the ordinary weight (229 pounds) are very unhandy, are more apt to become wet, often tear or rip open, and in my estimation possess no advantage over the barrel.

The simplest efficient marching or field ration that I have known issued is the full ration of meats, hard bread, ground

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coffee, sugar, salt, and pepper, and half rations of vinegar and soap. If salt meats only are issued, the salt and pepper may be dispensed with.

I have always been required to report to the chief or army commissary three times per month the amount of stores in my possession at the date of the report, giving the amount in pounds and the number of rations of each article; also to make a trimonthly report of the amount of commissary property on hand.

Antiscorbutics are necessary in some form to the health of the troops; the desiccated are more easily transported when properly packed than the green articles, but are not generally liked by the troops. The desiccated mixed vegetables are used to some extent, but the desiccated potatoes have never been used at all after the first trial.

A small supply of pickles and curried cabbage should always be kept on hand for sale to company messes, or for issue in lieu of some component part of the ration.

The best, and in my opinion the only necessary green vegetables are potatoes and onions; these with proper care may be kept a long time, are easily transported, are efficient as antiscorbutics, and are always a favorite with all troops. These, with pickled cucumbers, onions, and cabbages, will guard against any attack of the scurvy.

Other green vegetables, such as cabbages, beets, string beans, etc., can not be sent by sea or land to any distance without losing every good quality they ever possessed, and will reach the troops in such a condition that their use is more conducive to disease than health.

All such articles, to be of service, should be eaten when fresh, and if this is not practicable, the ripe and dried, or desiccated, are preferable. As a matter of economy I would suggest that no such green vegetables be purchased for troops; the wastage on green cabbages is at least 50 per cent and on string beans I should think that 75 per cent would not more than cover it.

A considerable annoyance often arises from commissaries, whose duty it is to sell to officers, making up their own price lists. They are correct, possibly in their figures and method,

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and yet, perhaps no two commissaries will have the same prices. This arises from the circumstance of the purchasing commissary invoicing his stores to the depot commissary at the actual price paid for each lot, and perhaps each lot has a different price. In order to give uniformity to this, the depot commissary should make out a price list at the end of every month, and these prices should be adhered to during the ensuing month, official copies of the list being forwarded to every commissary in the Department. To do this, the depot commissary should, say on the 30th of June, take every invoice that he has received during the month of June, and average the invoice price of each article, and this averaged price should be the invoice price for the month of July all through the Department. By following this plan the Government is entirely protected, and the individual officers will have no cause to complain that one commissary is charging them more than another for the same articles.

The above report is respectfully submitted. I have given simply the results of my immediate experience upon all the subjects that I have mentioned. There are many questions to which my attention was called by your circular letter of June 1 that I have had no experience in, and I have passed them without comment, believing that they would all be better answered by officers who have had charge of other departments, and the object of the Department attained more fully than by my attempting to report upon subjects with which I have had nothing to do, and can be conversant only by hearsay.

I am, General, very respectfully, your obedient servant,

F. C. FORD,
Captain and Commissary of Subsistence of Volunteers.

To BRIG. GEN. A. B. EATON,
Commissary General of Subsistence, Washington, D. C.

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OFFICE CHIEF COMMISSARY OF SUBSISTENCE,
DISTRICT OF SOUTHWEST VIRGINIA,
LYNCHBURG, VA., *August 25, 1865.*

BRIG. GEN. A. B. EATON,
Commissary General of Subsistence.

In reply to your circular letter of June 1, 1865, I select a few heads and communicate to you the results of my observations and experience on the matters they suggest.

Par. 7. Simplest efficient marching ration.—Bacon, sugar, coffee, as now; hard bread, eighteen ounces. Beef is not agreeable to troops on the march, is accepted only as a necessity, and is of very questionable utility, though cattle can be driven, while salt meats must be carried, yet I am fully convinced the loss of weight and quality in the cattle, the expense that must accrue, and the number of soldiers that must be employed in driving, herding, feeding, and slaughtering; the great difficulty and dissatisfaction of issuing (often without scales as can not be helped), and above all, the disrelish and inconvenience of the meat, which the soldier as often throws away as cooks, both from his distaste of "gristle and bones" (it can hardly with propriety be called "beef") and from the necessary interruption and sometimes the total cessation of the culinary process—that all these disadvantages make it better to carry salt meats in a train or on pack animals wherever it is practicable. Beef is the best and costliest meat ration, and always "in winter" preferred by troops in camp, but scorned with good reason on the march. It is so heavy and bulky that it must be cooked and eaten on the ground where it is issued or it will be thrown away.

Most troops (except Virginia men) prefer pork to bacon everywhere but on the march. Here all are unanimous for bacon, and the reason is they can eat it without cooking, since it is not as salt as pork and is generally drier.

Smoked bacon is liked, but salt is not wanted by troops supplied with bacon or pork. They sometimes draw it, but seldom use it except for the horses in the regiment. Hence the bacon ration is lighter not only in itself, but also by the weight of the salt that must always accompany fresh beef.

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Soldiers marching prize their coffee higher, and cook it more easily and expeditiously, than any other part of the ration; it does not require them to carry an extra utensil as for beef or pork.

Inasmuch as neither beans nor their equivalents can be carried on the march, the bread ration should be increased, and here I observe that the Cincinnati crackers (or those known as such in the army) are much the best liked, but should be of small size like New York or Baltimore bread for two reasons, because the packages (of 511 pounds) will then be in a better shape for the army wagons, and especially because the soldiers will make them last longer, for it is only by limiting themselves to so many crackers a day, and so many a meal, that they can restrain their hunger. If, in dividing their hard tack between breakfast, dinner, and supper, they must make fractions, they will always make them in practice too large, eating a half when their proper allowance is but a third or a fourth, and the greater the cracker the greater the evil. But if the crackers in a ration are so many that three or four is the allowance for each meal, the soldier will stop at that stint. Thus it happens that when soldiers have been fed on New York bread and then on Cincinnati bread they come short of making their rations hold out, being tempted by the larger size, as well as superior taste. This is eminently the case when troops are not on full rations.

Par. 8. Number of complete rations a soldier can carry on his person.—As I am not a physician I do not look at this question as if it were asked me to compute in rations the weight and bulk that a soldier could carry without breaking down. As a man of business I may consider what soldiers do carry of such things as they most need—all that they can carry, for it is evidently all they themselves judge themselves able to carry. In the first place, these soldiers never carry complete rations unless they expect transportation. I have been ordered to issue beans to soldiers about to march but the beans were invariably left on the ground. Yet of all the vegetable parts of the ration, beans are generally preferred. You may issue as much as you please of molasses, vinegar, soap, candles, pepper, salt, beans, rice, etc., to troops

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ready to start on a march, but it will all be left behind by the "veterans," and if carried a few miles by the "recruits" will be cast out and be trodden underfoot as soon as they get tired.

Besides the weight, so many and different incongruous articles, mainly of a perishable nature, can ill be bestowed on the person even if there were room enough, for one has not got the packages to put them in, and if with trouble and cost he should procure them they could not be kept.

The haversack will hold comfortably but three days' marching rations, composed as above stated, and not over four can by any possibility be crowded into it. Soldiers generally put their coffee and sugar together in one bag, their pork or bacon into a paper, and then with what hard bread they can put into their haversack, the rest into the knapsack; but as bread in the knapsack gets broken and much wasted, some, therefore, prefer to throw away the surplus at the outstart, or to take less pork or sugar or coffee.

The haversack should be a little broader, between the straps somewhat thicker, but no deeper without an inside bag and with straps longer or shorter according to the size of the man.

As to the matter of weight, four marching rations is as much as a man ought to carry. These will weigh 8 pounds 6.72 ounces, or, with the haversack, about 9 pounds.

Each man has his rubber and woolen blankets, half shelter tents, knapsack, canteen, gun and accouterments, extra cartridges and clothing, and either a small hatchet, skillet, or some other utensil that belongs to his squad to carry constantly. These with 9 pounds of rations make load enough.

Par. 16. Cooking and cooking utensils.—On the march all cooking utensils should be left, except those for headquarters. Soldiers of the line will cook for themselves, with no utensils except a knife, sometimes a skillet. Camp kettles are here worse than useless, and are usually hung in great knots under the wagons, whence many are dragged off and lost, for nobody uses them unless some of the train guard may muster up energy enough to untie one when there are more potatoes and onions on the train than they like to eat raw. They are carried simply and only because the quartermaster must account for them. In camp every company should be provided with a

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tub, and two or three would be better. A pork, vinegar, or whisky barrel, sawed in two, makes a very good tub. It would be policy to allow a few of these to each company instead of requiring a commissary to receipt for all packages and return them.

There are other packages, particularly potato and onion barrels, and bread, soap, and candle boxes, that are of great value in an extempore camp for cupboard, shelves, bunks, chimneys, etc., and should rather be allowed the men. In a fixed camp or winter quarters it is a great advantage to have a regular cook and cook house for each company. It saves time for the men, and makes them devote more attention to cleanliness and drill. It saves rations, is far more healthful, comfortable, and (properly conducted) satisfactory.

A thick sheet-iron stove, of a rounded form, and capable of taking sticks 2 or 3 feet long, three large mess kettles, and a spider or two, with some tools from a commissary's chest, are an outfit. All companies will supply themselves with whatever else is needed, and some have within my knowledge provided even them at a cost of over $60 to each company for the total outfit rather than forego the privileges of such an arrangement.

Rations should then be drawn for eleven days at a time (this is every way the most convenient number), and should include all parts of the ration, for soldiers in camp will desire and use all parts if they can draw in sufficient quantities to make full meals of each article.

They will generally save something from the meat and coffee ration, which they wish commuted into vegetables and sugar. In fact, as the old ration stood, those companies of which I speak actually did save more than the cost of their outfit, but never realized a cent therefrom, "and thereby hangs a tale."

The savings in this, as in other cases, usually was appropriated by the company officers, embezzled by the cook and orderly in conspiracy, or in some instances were never paid for by a commissary on account of the neglect by the company officers to make out and sign the necessary papers. The best way, not only to avoid fraud but to make the matter

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easy, is to allow each company to underdraw its rations in whatever part it will, and commute the balance underdrawn into its value in whatever other parts they please.

Par. 17. Commissary property, scales, weights, desks, etc.; standard supply for a brigade for three months.—For a brigade, one 50-pound spring balance and two gallon tin pails; one scoop; one ax and helve, fitted; one hatchet and one claw hammer; one gallon measure; one meat saw; one cleaver; one tap borer; one meat hook; one butcher's steel; one molasses gate; one faucet, and four butcher knives.

For each regiment the same, except measure, molasses gate, faucet, and two butcher knives.

In camp and at a "post" the army platform scales are useful, but on a march they get out of order, are clumsy and heavy to transport, hard to load and unload, can not be carried readily short distances by hand, and are consequently behind time in an actual campaign. Of all the platform scales that accompanied the marches up and down the valley of the Shenandoah scarcely one was habitually used. The 30-pound spring balances did the work; these are not heavy enough, and the scale dish makes them very inconvenient, as it will not hold enough and its chains are constantly in the way and tangling, for the scale can not always be hung up, but must be held in the hand, and laid down again. If they were made to draw 50 pounds, that would be sufficient to break readily all ordinary packages at one or two drafts. The scale should balance at zero, so as to weigh meats quickly and conveniently, hanging them on the hook, while for other things a tin pail is far better than the dish.

A commissary must have an ax, and it should be furnished as commissary property, because it is so difficult to get one from a quartermaster. The hatchet should be without the cleft for drawing nails, which is entirely useless, and instead a claw hammer should be furnished for pulling and driving nails and mending broken packages.

The gallon measure should be marked for a pint, a quart, 2 quarts, and 3 quarts. One measure is better than two or more; in all things simplicity is a great object and especially in the number of things a person must look after on a march—

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handle, pack, and unpack. The quart measure is not large enough to expedite the issue of vinegar, molasses, and whisky.

In camp it may be expedient to have more than one, for you may wish to use several at once, but in the field one measure, one gate, and one faucet are all you will have occasion to use, and is much more likely to stay in your hands than if you should provide for losing one by furnishing two.

The tap-borer is all-sufficient without the gimlet, which is a dead weight to a commissary.

The funnel might be worth something if it were not every way too large; the nozzle should be not over a half inch in diameter and more deeply corrugated than it is; the body of the funnel is much too full.

The faucet should be a good one, that will not leak more at the handle than at the vent. Out of a whole set of common faucets you can not find one fit to draw vinegar, much less whisky.

The butcher knives should be well ground and sharpened. No dry measure is wanted; everything can be weighed.

Par. 19. What articles generally required to be purchased with hospital fund, and what quantity.—Candles, dried apples, dried peaches, potatoes, onions, corn meal, and flour.

In the field after a battle a double ration of candles for the number of men in each hospital should be issued, upon a return to be approved only by the surgeon in charge. It is important to have light immediately by which to dress wounds, heat plasters, etc. Those who ordinarily approve ration returns are either absent on the field or can be found only with great trouble and delay. As to quantity, in my experience hospitals never could get enough; all they asked for they actually needed.

A box of candles, a barrel of dried apples, one of dried peaches, one of corn meal, one of flour, the rest of a six-mule wagon load in potatoes and onions—these are the stores that should be carried strictly in reserve for issue and sale to each division hospital. They would ordinarily last a week, but the supply should be kept as near the maximum as practicable.

Par. 21. Preference of troops for various articles of the ration; what liked, what not liked, and what the alleged

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objections.—This depends almost entirely on the seasons of the year, and the circumstances of the troops.

In camp they will, if they have cook houses, prefer part of their coffee in sugar and meat in vegetables; the bread ration was never so large as to make soldiers wish to have it in something else. It is now insufficient, especially the soft bread ration, and here I observe that inasmuch as the same or greater wastage does actually occur in the transportation and issue of soft bread as in flour, the same or greater percentage should be allowed; it is often loaded from the ovens when by no means cool, and even if it were half cool, much is necessarily broken and lost in rapid loading and unloading, on heavy roads, etc. (Twenty ounces would be none too much for the weight, since even at that the soldier would not be likely, as things now are, to get more than his eighteen.) If they can draw ten days at a time, they will prefer potatoes. Beans are liked better than rice, and apples than hominy, unless men are short of bread. But in camp men will find no fault with any part of the ration of good quality issued with due regard to the season and variety. Rice is thought insipid without milk, but pork and beans make a favorite dish and quite nutritious; its healthfulness is another matter. The reason potatoes are not desired on short issue is the smallness of the ration; for the same reason onions are preferred to potatoes because they will go further.

But if the ration of potatoes were a pound or more, there is no vegetable so acceptable to soldiers, providing, always, they have time to cook and eat them before starting upon the march.

As a rule sauerkraut is much preferred to cabbage on curry, and pork to bacon. The cabbage is too spicy and the bacon too greasy; "hamfat" is its contemptuous appellation. Lean pork, in the same spirit, is called "sow belly." Too lean or young pork is not for the army. Salt beef of good quality is sometimes desired, but nothing is more despised than salt junk, or "salt horse," as the soldiers call this very old, very salt, very dry, and very tough bull meat.

Sugarhouse molasses or real good sirup is liked, but the other sorts are only wasted, and a great vexation to commissaries and clerks.

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Another point not mentioned in your list occurs to me as eminently needing reform. I refer to the present way of selling stores to officers. It is a failure, and withal exceedingly clumsy and burdensome, especially on the march, from the scarcity of paper and pencils (when pens and ink are altogether out of the question), the difficulty of writing, the press of time, and the ignorance of officers as to the form to be observed. Reading and judging the orders are very tedious operations, and very much interfere with the expedition of sales, which must often be held in the night, and when men are everywhere tired, sleepy, and anxious for supper.

The crowding and swearing on such occasions are confusing, and it becomes truly impossible for any one man to properly attend to the business. Yet frequently the sales must be confided to a single clerk. But again the order system utterly fails of accomplishing its design, which is, of course, to issue to officers only. Orders innumerable are forged, and this sometimes goes so far that the commissary is obliged to limit sales to officers in person, which always occasions great trouble and dissatisfaction, while if it is not done the market is run out on forged orders, and the commissary charged with selling to "privates." It is impossible to avoid these forgeries. In our armies "privates" often write as well and spell better than their officers. No person can be expected to know the signatures of all the officers in the brigade, constantly changing as they are when in actual service. Besides, it were useless if he did, for officers think it no harm to say that articles for their company are for their own use. And, moreover, it is absolutely impossible by any means short of starvation, to bring all officers uniformly up to the word "certify," and to the legal and acceptable shape and significance of a certification. They do not know it, and they will not be taught it. If it were practicable to distribute forms among them, and accept nothing else, that might remedy this defect. But this is by no means the worst defect. Practically, these orders, as well as certificates, "are never examined by anybody but the sales clerk and rarely by the commissary." They number from 20 to 300 per day, and constitute a book

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of from 20 to 300 pages; even if it were plainly written (not to say printed) on uniform paper and in a single handwriting of good black ink, the labor of examination would never be performed, much more so, never, when it is written on every conceivable quality, shape, and size of letter paper, brown paper, old envelopes, scraps of books, and newspaper, and in extreme cases even on chips, boards, shingles, birch bark, and slate stones; written, too, in the most divers of words, style, and idioms, in all possible spelling and handwritings, with every imaginable tool from pencil and stiletto to a knife or a bullet.

The farce of certifying, "I have compared the above abstract [of sales to officers] with the original orders in my possession," etc., is gone through by the certifying officer as a mere matter of form, when in truth he has never seen one of the orders, and even the sales clerk can scarcely be said to have noted their contents, since he has frequently to alter the quantities and even the articles called for, and can not always take time to decipher the hieroglyphical scrawl, but depends upon the word of the messenger.

In the field selling terribly clashes with issuing by occupying its place, takes time and clerks; insomuch, if there were no other reason, this alone is sufficient to condemn the sales. Therefore, in the field issue to both officers and men on one and the same return, giving the officers one ration or more as they may be entitled. In camp sell to officers and men for cash, keeping an account of sales in a book for that purpose. There is no danger of an abuse. Men will not buy more than they need, chiefly sugar and vegetables. An extra supply is easily kept, and the sutler will be far less patronized.

All which is most respectfully submitted by

Your obedient servant,

S. S. PATTERSON,
Captain and Chief Commissary of Subsistence,
District of Southwest Virginia.

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FEEDING A GREAT ARMY.

(By Bvt. Brig. Gen. Thomas Wilson, colonel, Acting Commissary General of Subsistence, U. S. A., in the United States Service Magazine for February, 1880.)

On May 4, 1864, the Army of the Potomac left Brandy Station, on the Rappahannock River, near Culpeper, Va., for the campaign during which were subsequently fought the battles of the Wilderness, Spottsylvania, Cold Harbor, and others. The base of supplies for this army had, during the winter, been at Alexandria, Va., some 50 miles distant by rail. When the army began its march across the Germania Ford its strength aggregated about 150,000 souls, including the corps of Major General Burnside, which was to follow the main army in a few days. It was intended that the troops should cut loose from their base of supplies, and it was estimated that rations must accompany them to last for some sixteen days, or until such time as they would be enabled to draw from a new base to be established in the vicinity of the position which the army was expected to take up before these supplies became exhausted. I was sent for by Major General Meade, commanding the Army of the Potomac, and directed to arrange for the subsistence supplies for the army accordingly.

The soldiers were required to carry in their knapsacks three days' rations, and also in their haversacks three days' rations of hard bread, coffee, sugar, and salt; issues of these articles from the supply trains to be made to the men every two or three days, when practicable, so that at no time would a soldier have on his person less than from three to five days' rations of them. The supply trains were required to carry ten days' rations of the same articles, and one day's rations of salt pork. It was also ordered that the remainder of the meat ration should be provided in beef cattle on the hoof, to be driven along with the troops, but not to occupy any roads used by the latter and thus interfere with the march of the soldiers, and that an aggregate supply of beef cattle on the hoof for thirteen days' rations be so driven.

Some idea of the length of the wagon train which it was requisite should accompany the army during this campaign

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may be formed when it is known that, after containing the subsistence stores above mentioned, the ammunition, the necessary forage for the animals, and clothing required to replace that worn out during the march, this train, had it been placed in a right line, when the first wagon was entering the city of Richmond the last one would have been just leaving the city of Washington—a distance of about 130 miles by rail.

Together with the immense herd of beef cattle kept at Brandy Station for the current needs of the army, I found that, to carry out my orders of supply, it would be necessary to have sent up to the front from Alexandria, some 50 miles distant, about 6,000 head of beef cattle, with the forage, corn in the ear, and hay necessary to subsist them until the march began, and this feat had to be accomplished between one Friday morning and the following Tuesday night; or, in other words, to arrive in time and for the purpose needed, an average of 1,200 head of beef cattle had to be sent me daily for five days, with the necessary forage for their maintenance.

The existing capacity of the Orange and Alexandria Railroad in cattle cars was, at this time, for about only 300 head daily. I telegraphed to Alexandria to know whether the number of cattle required could be sent up. The reply was that "they must be sent up."

This sudden call and the subsequent remarkable feat of shipping 6,000 cattle over this road of a single track, in the time required and with its limited resources, was accomplished by the authorities seizing all the flat cars within reach, and placing fences around them; also, all the freight cars that could be obtained, and removing portions of their sides for ventilation. In this manner 1,800 head were sent up in one day of twenty-four hours. At one time during the shipment an endless train of cattle cars was in transit, most of the railroad sidings being filled with them, and as a passenger or freight train would pass a station and a siding, the trains of cattle cars waiting thereat would be pushed forward to another one. We received all the cattle asked for before the time needed.

Three hundred men were kept constantly employed in unloading the cattle cars on their arrival at the front, so that the emptied cars might be sent back without delay.

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During the march the movements of the cattle were so arranged that the number corresponding in the meat ration to the number of days' rations of hard bread, coffee, sugar, and salt in the men's haversacks should march as a unit of a brigade organization; the number for the same purpose to constitute the meat ration corresponding with the number of days' rations in the soldiers' knapsacks were marched as a division unit; sufficient for the remainder of the meat ration were driven as a corps herd organization. In addition to these, there was a general herd provided as a reserve, upon which drafts could be made, when necessary to replenish the corps herds.

During this compaign Major General Meade, commanding the Army of the Potomac, required the chief of each supply department to be present near his person all the time. He also required reports from them, whenever he thought proper to do so, as to the status of supply in all particulars, at the moment when he might make a demand for such information, which the chiefs of the staff departments were enabled to furnish him from reports received twice daily from each corresponding chief of the department of a corps, so that at any moment when he or General Grant, in command of the armies operating against Richmond, desired to know the status of the subsistence supply of any brigade, division, or corps of the Army of the Potomac, with a view to its detachment, or for any other purpose, the chief commissary of subsistence was enabled to give it on the spot when called upon.

The following exhibits the organization of the subsistence department of the Army of the Potomac during the campaign from Brandy Station to Petersburg, the army leaving its camps on the 4th of May, 1864, as before stated, and on June 16, 1864, the commanding general and staff reached the fortifications of Petersburg.

Organization.—On the opening of this campaign the Army of the Potomac was organized in the following corps and independent commands, viz:

Second Army Corps, Fifth Army Corps, Sixth Army Corps, Cavalry Corps, Artillery Reserve, First Brigade Horse Artillery, Second Brigade Horse Artillery, regular Engineer

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Battalion, Volunteer Engineer Battalion, Provisional Brigade (Provost-Marshal General), and subsequently attached to this army were the Ninth Army Corps, and during the campaign the Eighteenth Army Corps.

The Second Corps was organized as shown in the list following, which also exhibits the organization of the subsistence department of that corps:

Division.	Brigade.	Name.	Rank.	Remarks.
1		J. S. Smith	Lieut. Col. and C. S.	Chief C. S.
		A. C. Voris	Capt. and C. S	Chief C. S. Div.
	1	R. W. Thompson	do	
	2	C. S. Langdon	do	
	3	L. L. Rose	do	
	4	G. P. Burnham	do	
2		T. S. Cromberger	do	Do.
	1	F. W. Owen	do	
	2	G. B. Corkhell	do	
	3	W. A. Nicholls	do	
3		C. M. Rabius	do	Do.
	1	G. W. Cooney	do	
	2	D. C. Tomlinson	do	
4		C. J. Queen	do	Do.
	1	G. W. Beach	do	
	2	J. N. Comstock	do	
	Artillery	J. T. Elliott	do	

This corps before the conclusion of the march underwent reorganization by the addition of troops assigned to it; the Fourth Brigade, Second Division, was created. Capt. B. F. Weeks served as commissary of the brigade.

The Third and Fourth Brigades, Third Division, were created. Capt. J. H. Parkham, Sixth Massachusetts Volunteers, served with the former as acting commissary of subsistence of the brigade, and Capt. J. Crawford, acting commissary of subsistence with the latter.

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The Fifth Army Corps was organized as exhibited in the following list:

Division.	Brigade.	Name.	Rank.	Remarks.
1	———	D. L. Smith	Capt. and C. S.	Acting Chief C. S.
	———	M. R. Came	do	Chief C. S. Div.
	1	E. W. Warren	do	
	2	W. T. W. Ball	do	
	3	G. W. Weir	do	
2	———	F. Gerker	do	Do.
	1	N. Mayhew	do	
	2	B. F. Bucklin	do	
	3	W L. Kenly	do	
3	———	P. B. Spear	do	
	1	J. D. Adair	do	
	2	J. S. Burdette	do	
4	———	C. McClure	do	Do.
	1	H. C. Halloway	do	
	2	A. Walker	do	
	3	W. E. Rathbone	do	
	Artillery.	S. R. Steele	do	

The organization of the Sixth Corps is exhibited in list below:

Division.	Brigade.	Name.	Rank.	Remarks.
1	———	J. K. Schofield	Capt. and C. S.	Acting Chief C. S.
	———	J. G. Fitts	do	Chief C. S.
	1	E. S. Converse	do	
	2	W. J. Campbell	Lieut., 91st Pa. Vols., and A. C. S.	
	3	W. D. Wasson	Capt. and C. S.	
	4	W. R. Hedden	Lieut., 65th N. Y. Vols., and A. C. S.	
2	———	C. C. Morse	Capt. and C. S.	Chief C. S. Div.
	1	H. B. Masters	do	
	2	A. B. Valentine	do	
	3	G. F. Burroughs	do	
	4	W. J. Ellis	do	
3	———	E. M. Buchanon	do	Do.
	1	D. H. Veach	do	
	2	H. L. McKee	do	
	Artillery.	L. W. Muzzy	do	

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The Cavalry Corps was organized as follows:

Division.	Brigade.	Name.	Rank.	Remarks.
1	———	G. W. Woods	Lieut. Col. and C. S.	Chief C. S.
	———	M. F. Hale	Capt. and C. S.	Chief C. S. Div.
	1	C. Brewster	do	
	2	W. Thompson	do	
	Reserve	P. Dwyer	Lieut., 5th U. S. Cav., and A. C. S.	
2	———	P. Pollock	Capt. and C. S.	Do.
	1	J. N. Potter	do	
	2	G. W. Eddy	do	
3	———	G. J. Taggart	do	Do.
	1	J. D. Earle	do	
	2	N. S. Shannon	Lieut., 3d Ind. Cav., and A. C. S.	

The organization of the Artillery Reserve was as follows:

Brigade.	Name.	Rank.	Remarks.
———	B. F. Talbot	Capt. and C. S.	Chief C. S.
1	H. Smith	Capt., 6th H. Art., and A. C. S.	
2	D. Tarbell	Capt. and C. S.	
3	M. Bayliss	do	

The following officers were serving as commissaries or acting commissaries with the several independent commands, respectively, viz:

With First Brigade Horse Artillery, Capt. H. L. Crawford, C. S.

With Second Brigade Horse Artillery, Lieut. W. M. Mayndier, 1st U. S. Art., A. C. S.

With Regular Engineer Battalion, Lieut. W. H. Benguard, Corps Engineers, A. C. S.

With Volunteer Engineer Battalion, Lieut. G. Templeton, 50th N. Y. Engineers, A. C. S.

With Provisional Brigade (Provost-Marshal General's Department), Capt. H. P. Clinton, C. S.

With miscellaneous troops, etc., Headquarters Army of the Potomac, Capt. J. R. Coxe, C. S.

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The Ninth Army Corps was attached to the Army of the Potomac during the march, and on May 25 its chief commissary of subsistence was directed to report to the chief commissary of subsistence of the army. On the 27th of May the organization of that corps was reported to the chief commissary of subsistence of the army to be as follows:

Division.	Brigade.	Name.	Rank.	Remarks.
1	-------	E. R. Goodrich	Lieut. Col. and C. S.	Chief C. S.
	-------	J. Justin	1st Lieut., 100th Pa. Vols., and A. C. S.	Chief C. S. Div.
	1	S. B. Tobey	1st Lieut., 3d N. Y. Vols., and A. C. S.	
	2	J. B. Goodrich	1st Lieut., 21st Mass. Vols., and A. C. S.	
	3	P. H. Hedges	1st Lieut., 14th N. Y. Art., and A. C. S.	
2	---------	J. H. King	Capt. and C. S.	Do.
	1	S. Fessenden	1st Lieut., 7th R. I. Vols., and A. C. S.	
	2	J. H. Varney	1st Lieut., 6th N. H. Vols., and A. C. S.	
3	---------	J. H. Coale	Lieut. Col. and C. S.	Do.
	1	R. D. Johnson	Capt., 2d Mich. Vols., and A. C. S.	
	2	A. Jones	1st Lieut., 50th Pa. Vols., and A. C. S.	
4	---------	A. Gregory	Capt. and C. S.	Do.
	1	E. F. Emory	1st Lieut., 36th Mass. Vols., and A. C. S.	
	2	B. H. Stile	1st Lieut., 25th U. S. C. T., and A. C. S.	

The Eighteenth Army Corps was attached to the army a day or two before the battle of Cold Harbor, and on June 1 the chief commissary of subsistence of the corps was directed to report for duty to the chief commissary of subsistence of the army.

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The organization of the Eighteenth Corps was as follows:

Division.	Brigade.	Name.	Rank.	Remarks.
1	---------{	J. Hall	Capt. and C. S	Acting Chief C. S.
	---------{	G. C. Wetherby	---do	Chief C. S. Div.
	1	J. H. Wilkinson	2d Lieut., 2d N. H. Vols., and A. C. S.	
	2	H. J. Spooner	1st Lieut., 4th R. I. Vols., and A. C. S.	
	3	C. O. Hubbel	1st Lieut., 92d N. Y. Vols., and A. C. S.	
	4	P. Riley	1st Lieut., 10th N. Y. Vols., and A. C. S.	
2	---------	M. A. Hill	Capt. and C. S	Do.
	1	J. H. Fowler	1st Lieut., 27th Mass. Vols., and A. C. S.	
	2	S. S. Reeder	1st Lieut., 148th N. Y. Vols., and A. C. S.	
3	---------	R. Holmes	Capt. and C. S	Do.
	1	J. M. Avery	1st Lieut., 48th N. Y. Vols., and A. C. S.	
	2	J. H. Musser	Capt. and C. S	
	3	H. Holmes	---do	

The following officers were under the immediate direction of the chief commissary of subsistence, Army of the Potomac:

Officers of depot organizations—
Capt. D. D. Wiley, C. S.
Capt. G. L. Ames, C. S.
Capt. J. Benedict, C. S.
Capt. G. F. Thompson, C. S.
Capt. L. W. Smith, C. S.
Capt. J. Y. England, C. S.
Officers of the general cattle-herding party—
Capt. J. H. Woodward, C. S.
Capt. M. R. Murphy, C. S.

To every officer of experience in the army the preparatory orders for its subsistence supply were indicative of a long and fatiguing march, with the prospect of separation for a considerable time from a base of supplies. No one knew the plans of the campaign, but circumstances pointed to an overland route to Richmond. Preliminary instructions, such as the circumstances demanded, were given by the chief commissary

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of the army admonishing caution, promptness, and system to insure success in the Subsistence Department during the impending campaign.

Feeling that upon the efficiency of the Subsistence Department the comfort of the soldiers depended, and with a knowledge that men can not fight without food, and that a failure to comply with orders in a single instance might result in a failure of some important movement of the army for want of supplies, the responsibilities of the situation became apparent. To guard against a failure at the outset of the march, it was required that all the stores intended for supply be drawn at once, or as soon as the depot commissary at Brandy Station could furnish them, and that all stores be thoroughly inspected to prevent any unsound articles being taken, and thus remove by timely action a troublesome and serious cause of complaint.

The next difficulty that presented itself was the subject of transportation for the ten days' supplies ordered to be carried in the supply trains, the number of wagons being limited, and each corps was required to estimate for the exact number of wagons required, and that they be loaded to their utmost capacity. Each wagon was also required to carry five days' rations of forage for the animals, thus lessening the capacity of each wagon by 600 pounds. In addition to the forage carried it was estimated that each six-mule wagon should carry 2,400 pounds gross of subsistence. A convenient mode of packing the wagons was found to be as follows: Hard bread, 40 boxes in each one; pork, 6 barrels; and coffee, 4 barrels, making 10 barrels in the wagon; sugar, 10 barrels. Salt was distributed through the trains by displacing one barrel of sugar or coffee and inserting one sack of salt. The trains moved by divisions, the supplies of each train being under the immediate charge of a division commissary, whose duty it was to remain at all times with his train.

The posts of the brigade commissaries were required to be at the front at the headquarters of their respective brigades; the post of the chief commissary of each corps being at the headquarters of their respective corps commanders. Experience in former campaigns had shown that this system was the best in subsisting an army on an active campaign, and its

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effectiveness was fully demonstrated on the 26th of May, when the army was in position on the south side of the North Anna River, the trains being at Milford, 14 miles distant from headquarters, when, at 12.30 p. m., an order was issued from army headquarters requiring each corps and independent command to at once send to their supply trains for four days' rations, to be issued the same night, so that on the morrow the troops would have six days' rations upon their persons. By 9 p. m. the same night the troops were rationed as ordered. Had the chief commissary of subsistence of any of the corps not been at corps headquarters, the division commissaries not with the trains, or the brigade commissaries not with the troops, serious delays and inconvenience would have ensued, as some of the corps had no communication with the supply trains for several days after the movement.

On the 8th day of May, and after the battle of the Wilderness, a special order required five days' rations to be issued to the entire army, and that the empty wagons be sent back to Fredericksburg to be reloaded. On this day an officer reported that some 1,100 wounded men in the abandoned field hospitals were suffering for the want of food, the rations supplied them when the army moved having been taken by the rebel cavalry and stragglers; an order soon afterwards required supplies to be sent to their relief, and under flag of truce if necessary. Three thousand rations were accordingly so sent, and the officer with his little train reached these men beyond our lines in the afternoon; a few rebel stragglers were in the camp pilfering what they could lay their hands on. These wounded men were famishing with hunger, having had nothing to eat for three days. Those who were able had gathered the refuse of the camp and culled from it a scanty subsistence; when informed that rations had reached them by the order of the commanding general, many of the brave fellows were so overcome that they wept, and from their glad hearts they expressed a joy that knew no bounds. The next day a division of the Second Corps was sent back, and succeeded in removing all our abandoned hospitals, wounded men, and stores.

On the 11th of May special orders from army headquarters required that five days' rations be issued at once to the troops

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of the whole army, including one day's rations of salt meat, and that all empty wagons be sent with as little delay as possible to Belle Plain, where a subsistence depot had just been established, there to be reloaded to their maximum capacity with supplies for the army, three days' salt meat to be included among the supplies drawn. An officer of the Subsistence Department was detailed from each corps to proceed with the wagons and draw the supplies for his corps; this officer's duty was to draw all stores for the corps, have the wagons loaded by divisions, and send to the division commissaries at the main train such supplies as they had estimated for.

On the 13th day of May another issue was made to the troops and the empty wagons sent to the depot at Belle Plain to be reloaded. The rations issued on this day made the supplies in the hands of the troops up to and including the 19th of May.

On May 16, and during the series of battles in the vicinity of Spottsylvania Court-house, on the recommendation of the chief commissary of subsistence of the army, an order was issued requiring each corps commander to detail a lieutenant from each division of his command to be charged with the duty of supplying the hospitals of his division the subsistence it needed. This order materially facilitated the issue of hospital supplies.

On the 20th of May the army moved from the front of Spottsylvania Court-house and crossed the North Anna River on the 21st. The trains withdrew from Fredericksburg and the depot at Belle Plain was broken up and a new temporary depot was established at Port Royal, on the Rappahannock River, a distance of 30 miles from the army; the supply trains were packed at Milford, about 14 miles from the army. On the morning of May 20 the troops had on their persons four days' rations. The division supply trains had eight days' rations for the army.

On May 31 the depot was removed from Port Royal and one was established at Whitehouse, Va., and the empty trains were sent to that depot for supplies.

On or about the 2d of June, and just before the battle of Cold Harbor, a new army corps joined the Army of the

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Potomac at its position in the field and away from the depots and I was directed to see that their immediate necessities were provided for, the corps not having supplied itself to any extent on leaving the Whitehouse depot. We were enabled to give this relief, and for that purpose 18,000 rations of hard bread, sugar, coffee, and salt, and thirty-seven head beef cattle were sent from the trains of one of the corps. These supplies so furnished had been hauled 50 miles in the wagons of the train; these wagons were immediately sent back to the depot to be replenished. During the campaign, and whenever possible, I had arrangements made by which, if the troops were not to move for a few days, the stores in the wagons were emptied upon the ground and the empty wagons sent rapidly to the depots to bring up potatoes, onions, and antiscorbutics, and I have heard the troops in line of battle cheer the Subsistence Department as the barrels of the vegetables were rolled into trenches and their heads knocked in.

On June 4 three days' rations were issued to the troops, making on their persons five days' rations from June 5.

On June 7 two additional days' rations were issued.

On June 9 two days' rations were issued.

On June 10 an order was issued requiring that four days' rations be kept in the hands of the men and six days' in the division supply trains, and the wagons not required to carry these stores be used to carry to the troops "antiscorbutics," fresh vegetables, etc.

During the entire march rations were required never to be drawn from the main trains unless ordered from the headquarters of the army except for immediate issues to hospitals, or to relieve troops who had lost their rations in action or who joined their commands from the hospitals.

To the system adopted by the chief commissary of subsistence of the army, in having the amount of rations in the hands of the troops and in the division supply trains reported regularly to him and a uniform system of issues, it is thought there can be attributed some of the success and credit due the Subsistence Department during this campaign.

In addition to the regular field rations issued large quantities of soap, vinegar, flour, pepper, pickles, dried apples, potatoes, onions, etc., were brought forward for sale to officers, for

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hospitals, and for issues to the troops generally, the wagons, as mentioned above, being utilized for this purpose, when it was safe to empty them temporarily of their regular supplies and send them to the depots to be filled with these articles.

When the Army of the Potomac reached the James River it crossed upon the pontoon bridge thrown across that river below and near Citypoint, Va., and the army began its investment of Petersburg, Va., about the 16th of June, 1864, with its base of supplies at Citypoint, and the task of supplying that army during the march ceased, the depot of supplies being very near and accessible to the position it then held.

Some idea may be formed of the immense quantities of food necessary to sustain a great army from the following statement, made up from reports received by me from the subsistence departments of supply.

I find that between May 1, 1864, and June 3, 1864 (the two months during which the above campaign was being conducted), there were drawn from the various depots established—

	Number of rations.
Pork	1,003,400
Bacon	10,419
Ham	234,832
Flour	40,477
Hard bread	3,881,225
Coffee	4,214,313
Tea	161,867
Sugar	4,652,189
Vinegar	299,200
Candles	726,000
Soap	1,298,000
Salt	4,043,540
Whisky	410,787
Pepper	832,617
Dried apples	535,840
Pickles	139,200
Pickled cabbage	416,533

And during this whole period, with the exception of some fifteen days, the troops were constantly marching and fighting.

The following antiscorbutics were issued to the Army of the Potomac during the eleven months anterior to this campaign, viz, from February 1, 1863, to December 31, 1863, and during

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much of this time the troops thus supplied were engaged in campaigns at times of great length and importance, during which they subsisted principally upon articles of the marching ration alone:

	Number of rations.
Flour	13,928,922
Corn meal	77,177
Potatoes	38,888,108
Onions	5,091,447
Dried apples	6,181,736
Dried peaches	280,043
Fresh beets	804,044
Fresh turnips	374,844
Fresh carrots	49,119
Fresh parsnips	9,428
Desiccated vegetables	1,034,948
Desiccated potatoes	212,659
Pickles	730,000
Fresh cabbage	669,810

The writer has prepared this article with diffidence, and only upon the solicitation of the editors of "The United Service." The nation acknowledges with gratitude the unrequitable debt which it owes to its brave defenders, who imperiled or lost their lives in its defense when its existence was at stake; and if this article will but serve to show that those who nobly, but quietly, labored to supply the fighting element of the army with subsistence—without which fighting and ultimate victory would have been impossible—merit some share of the national gratitude he will feel that what he has written will not have been written in vain.

COMMISSARY OF SUBSISTENCE.

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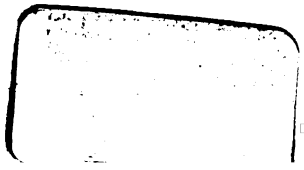
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